MARCH 1940

FOOD INDUSTRIES

HOMES OF FAMOUS FOODS . . . McILHENNY'S TABASCO SAUCE, NEW IBERIA, LA.

IN THIS ISSUE:

Quality Control as Developed by Butter Industry

Comparison of the Properties of Sugars

Instructions for Making Dill Pickles

Technology's Effect on Packaging

How Properly To Use Adhesives

MILLIONS OF MEALS DEPEND ON . . . . .

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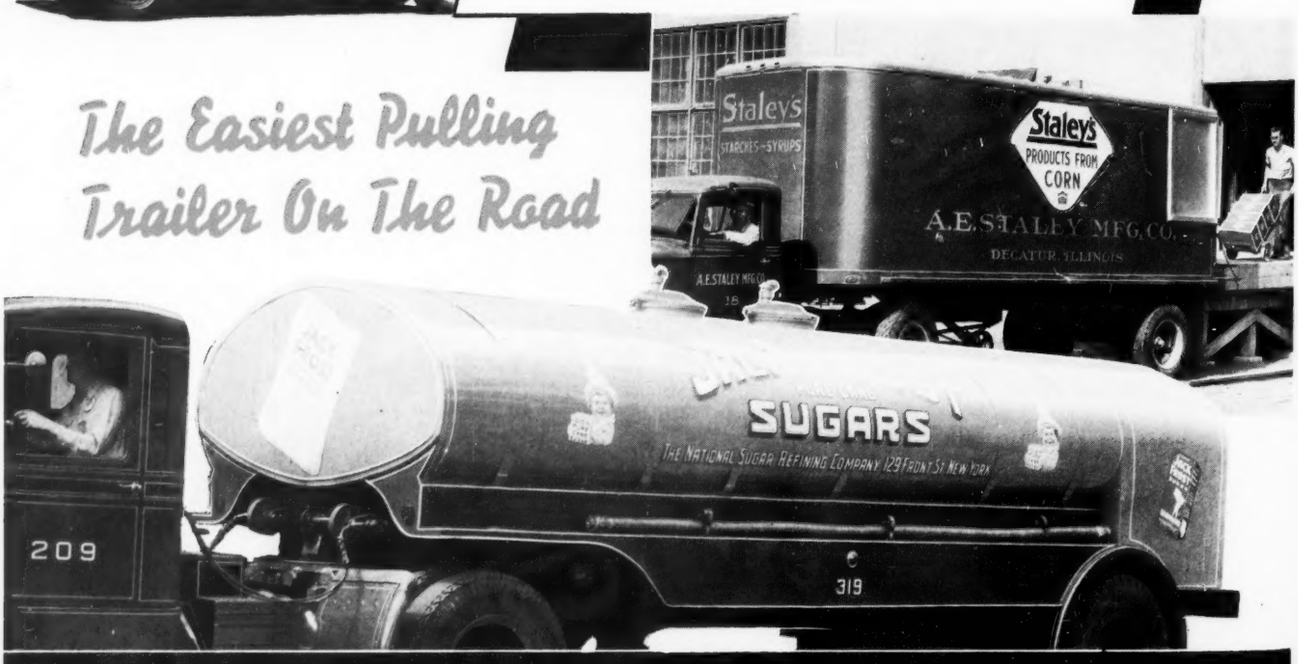

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★HOMES OF FAMOUS FOODS

Vine covered food plants are as unusual as they are pleasing to the public. On the cover of FOOD INDUSTRIES this month is a picture of such a plant, the factory in which Tabasco sauce is made by McIlhenny Co., New Iberia, La.

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In THIS *Issue*

• HOW TO MAKE IT STICK

Success in life has been said to lie in ability to "make it stick." However that may be, it is certainly a true remark when applied to packaging. Successful use of packaging materials demands an adequate knowledge of adhesives—which adhesive to choose for the job in hand and how to apply adhesive correctly to the packaging materials that are being used.

Basic information on this important subject will be found in an article by James P. Langwill, appearing in two parts, the first of which commences on page 55 of this issue. The author, long associated with food packaging, is in charge of research for Reynolds Metals Company.

• CHANGE CAUSES CHANGE

Rapidly shifting styles and types of food packages often cause expressions of wonder and doubt from those who are not thoroughly familiar with packaging. They doubt the need for the many changes and wonder if the net result is not mostly evident in increased retail prices.

That such opinions are wide of the mark is well known to all who package food materials. The changes made have given better product protection and have widened markets with resulting lowering of distribution costs. The technological reasons why this is so are discussed by Ivan C. Miller in an article beginning on page 53 and entitled "Technology's Effect on Food and Packaging."

• DOES HOT PARAFFIN KILL GERMS?

With the controversy over glass vs. paper for milk containers waxing hot in halls of politics, the food technologist needs to know the scientific facts that underlie the arguments. One of the questions often brought up refers to the sanitary condition of the familiar paraffined-paper milk container.

Research on this subject has been carried out by F. W. Tanner of the University of Illinois and H. F. Lewis of the Institute of Paper Chemistry. This month, Food Industries is privileged to present the results of this research. Turn to page 60, where the article will be found.

• ROOM FOR ARGUMENT

Yes, there seems to be plenty of room when food technologists start talking sugar. So it isn't at all surprising that everyone didn't agree with everything said about choosing sweetening agents in our November issue. Among the dissenters was Dr. Stroud Jordan of American Sugar Refining Co., a man who admittedly knows his sweets. And this month Dr. Jordan takes three pages to tell how one sugar compares with another with respect to sweetening value, food value and other factors of interest to food manufacturer and consumer. Don't miss this part of the debate on one of your commonest raw materials—page 45.

In FORTHCOMING *Issues*

• WATCH THE WEEVILS

Many packages of cereal products, which leave the manufacturer's plant apparently free from insect infestation, show up some months later on the grocers' shelves so "weevilly" as to be unsalable. What to do?

Two courses are open. Dealers' stocks can be kept so low, particularly during warm weather, that the product is consumed before infestation shows up. Or steps can be taken at the manufacturer's plant to prevent infestation.

Results of one manufacturer's use of the second method, carefully compared to infestation occurring in untreated control samples, will be discussed in a forthcoming issue of Food Industries.

• CHARTING YOUR COURSE

Production of any manufactured food consists of a number of steps, carried out in proper sequence and by means of suitable equipment. A diagram showing this sequence is called a "flow sheet" and Food Industries has already prepared a number of these for use by food engineers and food technologists who need to know how the other fellow operates. Two more of these flow sheets will appear in the April number.

• ANOTHER ANGLE ON SWEETENERS

In Food Industries for November, 1939, and again this month, articles appeared on the subject of sucrose, dextrose, sirups and other sweetening agents available to the food manufacturer. The purpose of these articles was to provide a factual background for food manufacturers, useful in connection with the battle of the sugars that has developed during the food standards hearings in Washington. A few more words need to be said on this subject and these will appear in Food Industries for April.

• WHAT THE HEALTH OFFICER THINKS

In Food Industries for February and March, a milk plant operator's views on the short-time, high-temperature pasteurization of milk were given. What a health officer thinks of this method of pasteurization, and under what conditions he thinks it should be used, will be told in these pages in April. Incidentally, many of the conditions specified hold for other continuous food processes under automatic temperature control which makes this article of interest to all food technologists.

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The Talk of the Industry

» TODAY'S FASHION seems to involve the technic of dire threats and warnings by the press of one nation to the government of another. With a slight amount of provocation we could really go to work on Russia, Japan and Germany.

Before our eyes the pages of history are being turned backward to cruelty and barbarism beside which the horrors of the Dark Ages pale into insignificance. "Our great patience is exhausted, etc."

» ON ONE of those frigid mornings recently, we dashed out of the house, jumped into our car and stepped on the starter. But alas, dam and ——! There was a serious shortage of amps in the battery. Just as our blood had come to a steady boil, what happens? A Borden milk man puts his front bumper to our rear bumper and

pushes gently but firmly until the car begins to percolate. Them's what we call effective public relations.

» CONSIDER the maple sugar fiasco. Maple sugar and maple sirup manufacturers are up against a tough problem with respect to the Food, Drug and Cosmetic Act. Maple products are frequently contaminated on the farm with lead which is picked up from a variety of possible sources. If the lead exceeds the prescribed tolerance of 1.43 parts per million, the product is illegal for shipment in interstate commerce, and its seizure is likely.

It is possible, however, to remove the lead from maple sirup by adding enough phosphate to precipitate it and then filter out the insoluble lead phosphate. But this is a factory job—not a farm job—and hence maple sugar concerns attempt to ship any high-lead product to their plants for de-leading. In the meantime, it usually gets seized. After a trial the court usually releases the product for de-leading as soon as the claimant posts a bond. De-leading is exactly what the manufacturer intended to do anyhow.

Under the law the Food and Drug Administration cannot permit interstate shipment of a food contaminated with lead. On the other hand, the manufacturer cannot afford to remove the lead except at a central plant. So, up to now there is only one way to proceed if, alas, a manufacturer has bought some high-lead sirup. And that way is to violate the law, get stuck for it, get one's good name in bad, all for the sake of getting a court order to permit shipment under bond to the central plant where the lead is to be taken out—even as the manufacturer had intended all along. Of course, the alternative is to go out of business, which wouldn't help the farmers nor the dear public to whom the farmers would inevitably sell direct from roadside stands if there were no commercial markets.

In other words, if you're a manufacturer who wants to do right, you've got to admit you are wrong first so that the court can make you do right. You cannot be permitted to do right voluntarily.

Some fun, eh boss.

» "I BELIEVE you and your countrymen take really more interest in the war than we do," writes a British

food magazine publisher in a business letter to FOOD INDUSTRIES. Bystanders always get more excited over a good scrap than do the participants. The fighters have to keep their heads.

» WALTER BAKER & Co., now a subsidiary of General Foods Corp., is 160 years old in 1940. Which makes it nine years older than the Constitution of the United States, adopted in 1789. In a country where very few businesses last even a century, this is an unusual record.

» AFTER ALL the fight to compel the inclusion of quality grades in the definitions and standards of identity in the Federal Food, Drug and Cosmetic Act, it is amusing to discover that Consumer's Union is taking a vigorous stand against grades for market milk. Anticipating a reaction to the foregoing comment, we shall be specific.

On Wednesday, Feb. 7, 1940, at 10 to 10:30 a.m., on Station WHN, Madeline Ross of Consumers Union took part in a forum discussion of the move to abolish Grades A and B for milk in New York City, to the end that all milk shall have but one grade. She was strongly in favor of eliminating the grade distinction.

For the moment we shall omit a philosophical discussion of any differences between grades for milk or other foods. But, just in case you may have forgotten some of the events of 1933 to 1936, let it be recalled that one of the most vigorous supporters of compulsory grade labeling in the early days of the efforts to revise the old food and drug law was Consumers Research. In those days, that well known team, Messrs. Arthur Kallett and Fred J. Schlink, whose specialty was verbal pyrotechnics, with a publishing business on the side, were quite vocal in their insistence on compulsory grading. They controlled Consumers Research and its several publications. In the ensuing years they parted company apparently because of differences arising from a strike at Consumers Research. Mr. Kallett then set up his own publishing business as Consumers Union. Miss Ross, one of his business associates and speaking in behalf of Consumers Union, is now opposed to grading. One who listened to her dulcet, cultivated voice could not fail to be impressed by her sincere conviction.

Can it be that the self-appointed guardians of the consumer blow hot today and cold tomorrow? Or is compulsory grading specifically reserved for application to food companies doing interstate business, while those who do a strictly intrastate or intracity business are to be compelled to do exactly the reverse and abandon compulsory grade labeling?

Either compulsory grades are good or are not good, as a matter of principle. And it is very disheartening to discover that Consumers Union seems to be subject to all the frailties of the human race, even as the rest of us, and changes its collective mind.

Hors d'Oeuvres

• A method has been discovered for putting vitamin D into alcohol. So if Prohibition ever comes back we can have a little sunshine in our moonshine.

• *"Optimism is to be taken with a grain of salt, while pessimism is better seasoned with pepper."* — *Shapesfear.*

• The packers call the frankfurt the symbol of American democracy, possibly because the people show their rugged individualism by stuffing it into their mouths in public places.

• *"A meal without meat is a meal incomplete" says a slogan created by Institute of American Meat Packers. If we wanted to be mean we could provide vegetarians with an antidote, such as: "A meal without meat is the meal you should eat."*

• *Clarence Saunders, famous for new ideas in merchandising food, has incorporated a "Rose Room" in his latest store in Memphis. This is a room where the customers may powder their noses, that is, where housewives may polish their pans.*

• So you have troubles? Well listen to Pepsi-Cola's London manager: ". . . The first thing that happened was that 9 of our 26 trucks were needed by the government—two panel bodies for ambulance service and seven regular delivery trucks for the Auxiliary Fire Service. We no sooner got squared away from this little bother when all petrol was put on a ration basis. . . . To overcome this we are employing handtrucks . . . and . . . our salesmen merrily trundle Pepsi-Cola from shop to shop. . . ." So you have troubles.

• *The public is being urged to buy dogs for pets in the 1940 Ideal dog food advertising campaign by Wilson & Co. Sound and simple. Now what technic should baby food manufacturers use?*

• Hold-up men took $2,000 from Colonial Baking Co. The next day this ad appeared in a Chattanooga paper: "The newspaper headlines show what others think of Colonial 'dough'. They like it, baked or unbaked. They call for it—no delivery necessary. If not ready, they insist on waiting. You too can enjoy Colonial Bread." That's turning the tables on trouble.

• *Some time ago we remarked that there ought to be a good prepared corn bread mix on the market. Since then we have received samples of corn meal mixes offered in answer to our prayer. We tried them out. We're still looking for a good corn bread mix. We never did care for corn muffins.*

• A manufacturer advertises stainless steel prongs for holding corn on the cob while eating it *a la* horse, *a la* pig, *a la* etc. These will keep the butter off your fingers, but what's to keep it out of your ears?

• *You've been hearing a lot about seasoned troops lately. Those are soldiers mustered by the officers and peppered by the enemy. If you've heard it before, laugh anyway. It's good for you.*

• "This company is only in its infancy," said Howard Heinz on the occasion of the 70th anniversary of H. J. Heinz Co. Looks like the advertising genius who conceived the "57 varieties" slogan was a bit conservative.

F. K. L.

Packaging Conference This Month

IF YOU are within traveling distance of New York, you should plan to attend the Packaging Conference and Exhibition at the Hotel Astor, March 26 to 29. This, the tenth annual conference on packaging, covers all forms of packaging, not merely food packaging. Employees of firms which are members of the American Management Association may attend free, but to others there is a small registration fee for attending meetings. The exhibition is free to all who are interested in packaging.

This meeting is all business, and if your job has anything to do with packaging, whatever aspect it may be, you will find it worth the effort and expense to attend.

Product Protection

THE FOOD INDUSTRIES have a greater stake in packaging than any other industry or group of industries because their products, being edible, must be carefully preserved and protected against contamination in transit from maker to user. Not only is this necessary from a health standpoint, but government regulations, already strict and becoming stricter, are such that a food manufacturer cannot afford to use a packaging material of which the chemical and physical qualities are unknown to him. Government regulations concerning lead, for instance, are now so rigorous that a food product might pick up enough lead to damn it, merely from contact with a packaging material containing only an infinitesimal percentage of lead. Lead has also been found in tea by the government's Sherlock Holmes, evidently picked up from the lead foil wrappers or box linings. Lead has been found in vanilla extract which became contaminated merely by flowing through a pipe that had been soldered with a lead bearing alloy.

It would seem worthy of consideration that the food industries should endow a packaging institute to make scientific investigations of packages and packaging materials. Every plant

should do some package material research, but to do the job exhaustively requires a greater investment than most plants can make. A few large firms such as General Foods, Standard Brands, and Merck & Company have instituted packaging research laboratories. Unfortunately, however, their results will not be made available to all firms in the trade. But information of this character is essential and should be available to all manufacturers confronted with a packaging problem. The usual practice of learning by costly trial and error methods should be replaced by scientific research.

How Synthetic Fibers May Affect Food Manufacture

FAR-REACHING EFFECTS may possibly arise as a result of placing on the market duPont's new synthetic textile fiber, Nylon, and Carbide and Carbon Chemical Co.'s new Vinyon. These are the fibers that are stated to be better than silk, and, if they live up to predictions, will go far to replace silk. Some measure of Nylon's public acceptance will be seen in the results of a test sale in Wilmington, Del., where 18,000 pairs of women's hosiery were sold in a single day.

What have these synthetic fibers to do with the food industry? It all depends on their future in the United States. If they succeed in replacing silk, the effect will be far reaching. First of all, they will hurt Japan's silk exports to the United States. Prices of silk are likely to drop, and economic ruin for Japanese silk producers may occur. Nobody will shed a tear over Japanese distress after their ruthless invasion of China. But, keep in mind the following facts: Japan produces about 93 per cent of the world's raw silk, and the U. S. takes about 80 per cent of Japan's production. Japan also is the world's largest producer of rayon, largely made from cotton lint imported from the United States.

Our cotton exports to Japan average about 1,500,000 bales. Japan takes about one-third of our cotton exports. This is an amount about equal to one-quarter of our own domestic cotton consumption.

The crux of the situation is found in the fact that we sell Japan about $88,000,000 worth of cotton and buy from Japan about $93,000,000 worth of raw silk. These aspects of foreign trade just about balance. What will happen if synthetic fibers replace silk? One would expect that cotton purchases should fall comparably. And that brings the problem back to the food manufacturer — especially the Northern manufacturer, for food manufacture is still largely a Northern enterprise.

As has been pointed out frequently in these columns, the Southern States, especially the Cotton States, are beginning to feed themselves. Ever since 1931, this billion dollar market has been slowly disappearing because the Cotton States are producing more of their own food. Furthermore, they are beginning to ship food north in increasing amounts.

FOOD INDUSTRIES takes no stand either for or against the trend. We are concerned only with the trend, its rate of change, and what it means to existing food manufacturers. Hence our only conclusion here is that *if* Nylon and Vinyon go over in a big way, the trend toward Southern food production—and manufacture—will be considerably accelerated.

What it may mean to individual food manufacturers is something that each should figure for himself and prepare to meet as best he may. To some it means diminished Southern sales. To others it means new competition from new Southern plants. (Two years ago, New England ice cream manufacturers were buying sweet cream from Tennessee!) To still others it will mean nothing at all. But to a few it will afford an opportunity to go South and grow up with the country—either as plants or as individuals.

Changes in Milling Practice

WHAT is termed "bulk storage" of flour has entered the flour milling business in the last two years, originating on the Pacific Coast. Bulk storage permits running the mills for 24 hours per day, storing the flour in huge tanks and packing for only 8 hours per day. Storage of the bulk flour is only for periods up to 30 days —not for prolonged periods.

The idea is that instead of blending wheats before grinding to obtain a flour of specified characteristics, which often change from customer to customer, and then packing it, the mill grinds the wheat separately on long runs, stores in tanks and blends appropriate flours when an order arrives.

Back of the innovation lies an economic reason. During recent years it has been pretty much a buyers' market, and buyers—especially foreign buyers —have been withholding not only shipping instructions and container specifications, but blend specifications as well, until a very short time before the ship to be loaded had docked on the American shore. Under previous practice the mill was sometimes forced to unpack previously filled containers in order to make prompt deliveries, but bulk storage avoids all that.

According to recent information, the new bulk storage method of operating, which was created to meet a distribution problem, gives a noticeable improvement in operating costs.

Help Wanted

IF you never visited our editorial offices, you may have a vague notion that most of our time is spent in reading manuscripts. Which would be as remote from the facts as were our own vague notions when we first joined the staff about twelve years ago.

Fact is that an editor must do a bit of head scratching over problems such as the one which follows. You are invited to send in your method of solving the problem. (Mind you, the question is how to *solve* the problem, not merely how to prevent its occurrence.) The chap who appealed for help is facing a condition, not an academic question.

"We are confronted with a problem of curtailing mildew development in the ducts of air-conditioning systems. The interior of these ducts is not accessible so that they may be cleaned with antiseptic solutions.

"Is there a fumigant which can be used in the air conditioner to destroy mildew? We thought of using formaldehyde candles in the air-conditioning system after closing the duct outlets, have the gases within the ducts do the work, but we doubt the efficacy of formaldehyde on mold. Have you any suggestions?"

There you have the problem. What's the best way to do it? We'd like to publish several answers if anyone knows how to get rid of the troublesome mold.

Pros and Cons of Milk Grades

WERE it not for the monetary costs involved, most well informed persons would emit coarse guffaws over the local controversy now raging in New York City over the action of Mayor La Guardia, who demands the abolition of differing grades of milk. He wants all milk sold under one grade. And he has broadcast appeals to the public over the city's own broadcasting station urging them to buy only Grade B milk, that Grade B is just as good as Grade A. When the dairy companies issued a reply, the Mayor accused them of "scoundrelly misrepresentation" and is quoted in the New York *Times* of Jan. 16, 1940, as saying:

"These figures are inaccurate and dishonest. There is a great deal of Borden Co. propaganda. They are great figure jugglers and my experi-

ence with the Borden people last year indicates that it is painful for them to tell the truth." Up to the moment of writing, the mayor has not denied the qotation. So it is probably substantially what the Mayor said.

Though the foregoing official reaction is indicative of an unfortunate public relations situation, the origin of which would require many thousands of words to discuss, the rejoinder by William H. Marcussen, quoted from the same undenied source, is commendable:

"Borden's records have been audited on several occasions by New York State. Our payments to farmers are audited every month by the Government of the United States. We do not make statements either to the public or our customers that are not supported by accurate records of actual costs of doing business. Borden's tells the truth."

In the short view, this squabble might be regarded as a strictly local affair, but in the long run it appears to be indicative of a trend that is spreading over the whole United States.

Our own attitude in the matter is one of studied detachment, and we try to estimate the pros and cons without rancor. It is well for all who are alarmed over the matter to keep in mind that Mayor La Guardia is genuinely favorable to increased milk consumption by the youth of New York. He is also genuinely desirous of decreased costs of distribution. At the dedication of Borden's enormous plant at 131st St., New York, about three years ago, Mr. La Guardia said he hoped the day would come when the housewife would go to the store to buy her milk just as she now goes for her cigarettes; that is was uneconomic for her to require the delivery of milk to her doorstep every day. He also protested against the use of fancy hood caps and anything else that would add to the cost of milk, as long as the less expensive bottle closures were safe from the health viewpoint. What he wanted was more milk, and less frills and service for the public's dollar. Greater milk consumption per person is his goal. With which there cannot be much effective disagreement.

Despite the previous attitude, the current effort by the city is to require hood (pouring-lip protecting) caps for all milk, and to require that there shall be a new grade of milk—a single grade—which shall conform to *new standards now being developed.* This would leave Grade A milk out in the cold. Yet regardless of the plain old hooey that is being shouted by the advocates of the new plan, there is a difference—a factual and legal difference—between Grades A and B.

Basically this difference, other than the legal requirements, lies in the fact that through the years the larger dairy companies have developed their Grade A business on milk containing a still higher fat and solids content. Milk from certain breeds of cows, such as Jersey and Guernsey, is decidedly richer in butter fat, and the cost of production on the farm is higher, chiefly because the yield per cow is less. And to get this milk under the prescribed legal conditions requires premium payments, running around $3,000,000 per year above Grade B prices to farmers.

Though the legal definitions of the two grades do not require the higher butter fat content in Grade A milk, there is no moral reprehensibility in putting a more desirable milk into Grade A and getting a better price for it. And nobody will deny that both milks are equally safe from the viewpoint of public health. If safety be the sole criterion of goodness, then both are alike.

On the other hand, the creation of the two grades was not an act of the dairy companies. Back in 1912 the New York City Health Department did it. And all who do business in New York City have had to comply ever since that year. Regulations surrounding the operation of dairies in New York have been so stringent that until the Borden plant at 131st St. was built in 1937, no Grade A milk operation was ever allowed under the same roof with a Grade B operation. Borden was allowed to do it only by virtue of setting up a separate, distinct and isolated plant for Grade A in the same building. In this Grade A operation, everything needed for Grade B was duplicated from the receiving platform to the refrigerated storage from which the drivers picked up their loads. Hence, in effect, it was really a separate plant, though under the same roof with the Grade B operation.

If, as Mayor La Guardia now asserts, Grade B is exactly as good as Grade A, then why in the name of common sense has it been necessary for the dairy companies to maintain unnecessary separate establishments for their Grade A operations? The Grade A volume is decidedly less than the Grade B volume, which inevitably makes for higher unit costs. If the Health Department has been wrong all these years then it is decidedly unfair to lambaste the dairy companies for their reasonable right and desire to protect the big investments that have been necessary in order to comply with the regulations. Whether the price differential between Grade A and Grade B is correct or not seems to be the real issue.

What is the common sense difference between the two grades? The late Senator Copeland commented on it in the hearings on the "Tugwell" bill, S.1944. Said he, "the real difference is a matter of a few hours," meaning that a few hours on the doorstep on a warm day will convert Grade A milk into Grade B as far as bacterial numbers are concerned.

Another view, expressed by W. B. Palmer, the famous and irrepressibly ironical health officer of Orange, N. J., is that the real difference is 3 cents per quart.

From the milk dealer's viewpoint, Grade A is a superior, high cost product having a better taste and higher fat content because of the selected farm from which it comes; and it must be specially inspected and handled separately from cow to consumer because of stringent regulations. Essentially it requires elaborate prepasteurization control over production and handling in order to insure the low bacterial count prescribed by law. And, as in the case with all top quality foods, the Grade A milk carries a wider profit margin than Grade B.

To which Miss Madeline Ross, of Consumers Union, replies to the effect that the extra butter fat in Grade A milk costs the consumer several dollars per pound.

And there we let the matter rest. Our guess, if it interests you, is that abolition of Grade A as a legal standard will sweep the country in the next few years. But we also expect that special brands of Jersey and Guernsey milk will continue to sell, as at present, at a price 2 or 3 cents above the price of milk from black and white cows which give milk containing about 3.5 per cent butter fat.

Belligerent Food Purchases

THE NEAREST THING that we can get to the lowdown on the intentions of Great Britain and France to buy food supplies in the United States is a bit of a disappointment. As we get it, the Allied plan is to buy foods here only for export to colonial possessions—not to the belligerent countries themselves. Foods to go to the belligerents will come from Argentina, Uruguay and Canada. The Allied plan will avoid shipping any food products out of England or France and thus minimize home feeding problems as well as marine transportation hazards.

Quality Control Improved by Research Methods

Practices employed to raise butter standard have wider application

By M. E. PARKER
Manager of Production,
Beatrice Creamery Co., Chicago, Ill.

Laboratory control of acidity by the quinhydrone electrode method plays an important part in the control of butter quality.

IN controlling the quality of its finished product, the creamery butter industry is not ignoring the march of time. Research methods of today become the quality maintenance procedures of tomorrow. An example of this trend in quality control, as well as an invaluable aid in anticipating the constancy with which butter will retain its inherent wholesomeness, is the so-called "keeping quality test."

This test is one to which butter is now being subjected by all creameries to which quality maintenance is a serious responsibility. Butter under test is held at approximately 70 deg. F. for eight days in an atmosphere of 100 per cent relative humidity. Loss in score is determined by a commercial grader at the end of the test. Studies have definitely shown that changes which take place in a sample of butter during this rigorous test parallel the changes which ordinarily will take place in butter during normal handling in trade channels. Since butter is often not consumed for a period of 30 to 60 days following its manufacture, the eight day keeping quality test will invariably indicate what can happen to it during the period in which it is being buffeted around.

This test lightens the burden of the commercial grader in respect to the prediction of the quality of the butter until the last patty is consumed in the home. Yet his judgment must still be relied upon for determining the loss in quality between the beginning and the end of the test.

Few, if any, food products could creditably withstand exposure to a temperature of 70 deg. F. and a 100 per cent relative humidity for eight days without the benefit of a sealed, impervious container or a protective natural skin. Yet creamery butter has to withstand such treatment in order to be considered as satisfactory for marketing. Accordingly, in this respect, creamery butter must be considered a distinctive food product; not a typical dairy product. Milk would lose its good quality within a few hours if subjected to 70 deg. F.

Even though good butter does creditably withstand the effects of these extreme conditions, it must not be assumed that 70 deg. F. and 100 per cent relative humidity are permissible conditions for storage or handling of butter. These conditions have been adopted for *test purposes only*. Incubation is merely to accelerate the effect of passage of time on butter held under proper conditions of storage.

To get the greatest benefit from the results of the keeping quality test, Beatrice Creamery Co. applies the test to all its butter as packaged for delivery to the home consumer. That practice is followed because experience based on a variety of technical reasons has shown that samples of butter taken at intermediate points between the churn and the market package can give misleading results.

To further illustrate the severity of the test as applied to our butter, we have found it to be expedient to use an ultra-violet ray lamp. The lamp is fitted into the test incubator to protect the interior of the incubator itself from the destructive effects of mold growths and moisture likely to accumulate in a room maintained constantly at 100 per cent humidity. Extensive laboratory tests have definitely proved that this lamp gives no protective properties to the butter samples contained in the

This article dealing with
QUALITY CONTROL

Is of interest to
All Food Manufacturers

Because it shows how research methods, developed in the course of running down plant troubles, can be applied to regular plant quality control procedure. Stress in this article is on testing and studying factors affecting the quality of the product during the time that elapses between its manufacture and consumption—The Editors.

cartons and wrappers used for market butter. The rays which are destructive to microorganisms cannot penetrate opaque materials.

When critical examination reveals that butter made in any of our creameries fails to conform to the proper standards of grade and keeping quality, the control laboratory moves into action. It applies a variety of microbiological, physical and chemical tests to establish the causative factor or factors of failure. Frequently, the source of a troublesome contamination can be located by the analyses of line-run samples of cream and butter taken at well-defined intervals and points of handling. Such remote control becomes effective only as the laboratory methods are developed with a sufficient degree of accuracy and exhaustiveness to establish definitely the factor responsible for the defect or defects in the butter. Trouble shooting is not eliminated. However, it is often anticipated and the necessity for it is avoided by making use of supplementary microbiological, physical and chemical aids. In this way, the *art* of butter making is being augmented by the *science* of quality control.

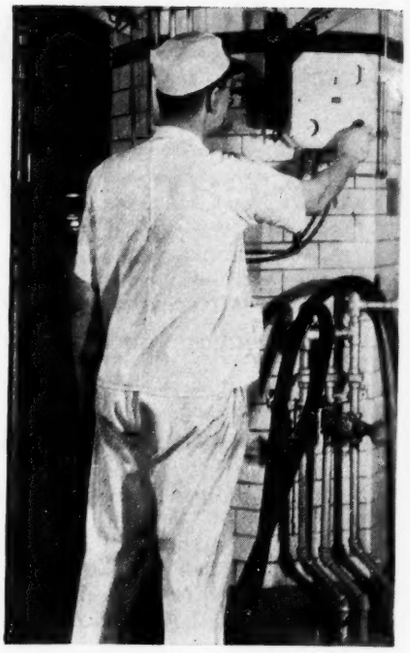
Although primitive man discovered that butter keeps better than the milk or cream from which it is churned, modern man has determined the factors that influence and enhance the keeping quality or freshness of creamery butter. The importance of fresh cream as the basis of inherent freshness in butter cannot be ignored nor minimized.

Because of its retarding influence upon microbial development salt has been credited with improving the keeping quality of butter. Salt, however, greatly increases the likelihood of chemical deterioration in butter. Salted butter can develop a fishy flavor defect in cold storage. In connection with this flavor defect, acidity and metallic contamination of the butter are involved. Studies of recent years have established the fact that the many flavor defects in salted butter can be minimized, if not avoided, by proper control of the butter acidity. Low-acid butter, while not possessing a relatively high flavor score, will retain its flavor score in cold storage more consistently than will the more highly flavored, more acid butter. These observations are confirmed by the trade experience that good quality butter made from sour cream may be withdrawn from cold storage with a smaller loss of score than ripened, sweet cream, high scoring butter. In our control laboratories we have relied entirely upon the use of the quinhydrone electrode method for pH determination in the control of butter acidity.

While freshness and keeping quality are essential, the *safety* of creamery butter is of vital concern. This safety factor of healthfulness is determined entirely by the thoroughness of the pasteurization of the cream and the protection of the finished butter from contamination.

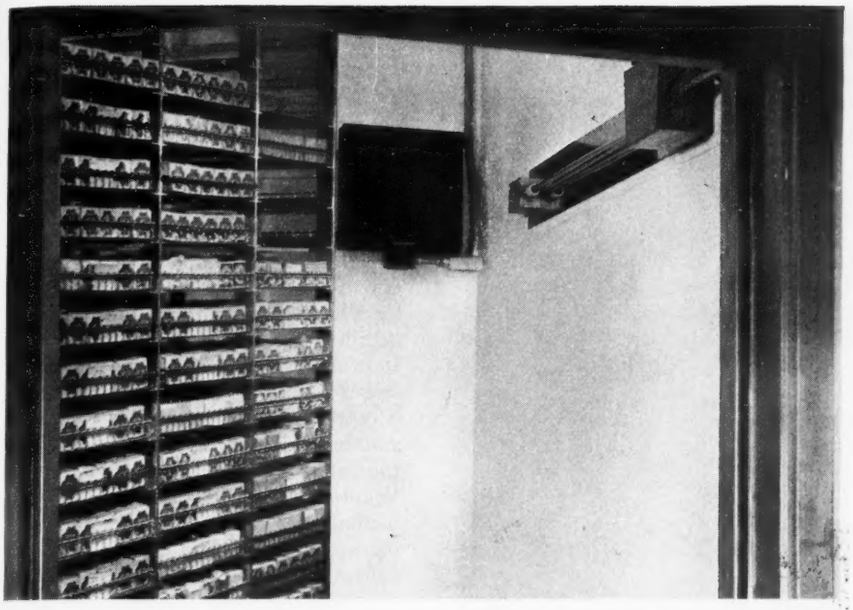
From the public health viewpoint, correct pasteurization of the cream is of vital concern in butter making. Probably because of production volume considerations, the vast majority of creameries in this country use the flash method. Some operators make the mistake, however, of attempting to control their pasteurizing temperature manually—an extremely hazardous procedure in the operation of a flash pasteurizer. Then, too, the judicious use of a bypass valve is essential if the mixing of pasteurized and unpasteurized cream is to be avoided.

From the control laboratory viewpoint, the phosphatase test shows considerable promise as a check on the thoroughness of the pasteurization of cream for butter making. The test may be applied directly to the cream or to the serum of the butter itself. If applied to the butter serum, use of only fresh samples of butter is advisable. Also it is advisable to eliminate the possibilities of false reactions resulting from factors other than the essential enzyme whose survival in the heat treated milk or cream definitely indicates inadequate pasteurization. More study of the application of the phosphatase test to creamery butter is desirable before its precise value can be appraised. Definite knowledge of the history of the butter under test, from the time it leaves the churn until its arrival at the laboratory, is essential to correct interpretation of phosphatase test results. Use of this test does, however, promise to make the quality control of a creamery butter



Automatic temperature control assures correct pasteurization as a protection to public health.

Individual patty forming and wrapping machine.



Butter in consumer packages held (incubated) for eight days in moisture saturated atmosphere at 70 deg. F. under thermostatic control develops such quality defects as are likely to become apparent in 30 to 60 days under normal marketing conditions. Unit heater and fan assures uniform temperature conditions in test room. Ultra-violet ray lamps reduce mold growths in room and keep deleterious effects on equipment to negligible amounts.

supply, under close and intelligent laboratory supervision, more certain for safeguarding the public health.

Physical and sanitary cleanliness of equipment and the avoidance of the contamination of the finished butter, caused either by direct infection or by infection of the cream following pasteurization, can be definitely indicated by the proper microbiological methods.

For that purpose, the method making use of potato-dextrose agar, as described in the Laboratory Manual of the American Butter Institute, has found wide acceptance. Considerable work done in recent years indicates that yeast and mold spore counts of butter and related products provide a reliable index of the sanitary efficiency of creamery production practices.

In connection with the sanitary features of quality control of creamery butter, modifications of the Burri smear culture technic are proving of inestimable value. Although the Burri test method has found wide acceptance in Europe, it is just beginning to become established in this country. Probably there has been too much emphasis on the quantitative significance of bacterial counts and not enough attention directed to qualitative methods which have as their virtue the identification of the general types of bacteria responsible for quality defects.

We have found that the Burri smear technic reveals the points of infection in many instances that mere bacterial counting would never have even brought under suspicion. We have had the experience of actually being able to incriminate treated water which was definitely deleterious to the quality of butter washed with it, although quite safe from the standpoint of public health.

Purity is an obviously essential property of butter for healthfulness. Creamery butter is the one food product defined by act of Congress. It must contain at least 80 per cent of milk fat by weight.

The Kohman method of analyzing butter makes possible ready checking of the composition of butter. All modern creameries carefully test and retest their butter daily to assure purity from the butter fat content angle.

Further than that, purity is today being measured in terms of parts per million instead of per cent or parts per hundred. Metallic contamination is beginning to receive as much attention as qualitative fat analysis did a few years ago. This statement holds, although we are only on the threshold of realizing the full importance of metallic contamination. During recent years, we have learned that as little as one or two parts per million of copper will affect the flavor of milk. We recognize that minute quantities of copper, together with iron, undoubtedly are involved in speeding up the oxidation of milk fat and the consequent lowering of the quality of butter.

Microanalysis, used for determining the metallic contaminants in butter, is also bearing fruit when used in other directions. Good authority has recently indicated that minute concentrations of certain nonmetallic elements in the washing water will actually impart metallic flavor defects to butter—another "believe it or not" for Ripley.

The quality control factors emphasized thus far are in addition to practices quite common to the creamery butter industry. For years, butter has been graded by the skilled taste sense of commercial and official judges on the arbitrary and numerical basis of 45 points for flavor, 25 for body, 15 for salt, 10 for color and 5 for package.

Checking one market with another will reveal that butter considered "standard" in some sections will be recognized as "extra" in another region, and vice versa. The reason appears to be that certain flavors and aromas given premium rating in some markets are discounted elsewhere. In spite of these differences, there is a remarkable agreement of scores among skilled graders in a given market.

Also, there is the difficulty of defining quality. Like the famous blind men in respect to defining an elephant, recognition is easy but definition is difficult. Whatever definition may be given to quality in creamery butter, the admission must be made that not only is quality in butter recognized by the consumer but the consumer's demand for high quality in butter is growing.

Whether quality in butter is evaluated on the basis of aroma and flavor, body or texture, color and wholesomeness, or on the basis of legal standards of definition, the consuming public, as well as the commercial judges, place their emphasis on the uniformity of flavor and on the keeping quality of the product.

MEETING this demand for uniformity and stability in a product made from such a perishable and variable raw material as dairy cream requires application of food engineering in its many aspects. For reasons of uniformity and stability, plus the growing importance of the public health aspect of food manufacture, the art of manufacture during the past 30 years has come more and more under the guidance, supervision, and, in very recent years, near domination of the science of manufacture. This evolution has progressed to the point where the butter industry recognizes its responsibilities to the consuming public and is taking well defined steps to meet these responsibilities.

It is to this end that the Beatrice Creamery Co. has, over a period of

years, set up a program of quality control based essentially on the meticulous grading of its butter and the uniformity of its keeping quality, plus the already discussed exhaustive laboratory testing to insure its healthfulness.

In application, the grading portion of our program begins with the exercise of judgment by an experienced and trained commercial grader with his staff of qualified assistants. These men are skilled in recognizing consumer preferences and in detecting off-flavors. Although the presence of off-flavors (often resulting from the feed that the cows eat) is generally emphasized and even magnified out of all proportion to consumer reaction, all such butter must be graded out to keep the finished butter output uniform in quality. For only by such practice can consumer confidence be won and held.

In judging the quality of a food product, the general run of consumer is unquestionably influenced by the selling price and the neatness and appeal of the package, as well as by flavor or taste. Variety may be the spice of life, but with a staple food like butter, experience has demonstrated that uniformity is the criterion of the great majority of the consuming public, the connoisseur to the contrary notwithstanding.

Uniformity in flavor and taste is not all that the grader must seek. Not only must he consider the source of production and the ultimate market, he must also possess the instinct to predict keeping quality. In this latter requirement, human frailty has been charged with a responsibility where even expert opinion and knowledge have been severely — perhaps even unjustly — tested. Here is where the keeping quality test procedure comes in to a marked advantage; it substitutes controllable and reproducible testing for little better than rule-of-thumb predictions.

In its application of integrated control over the quality of its butter, the Beatrice Creamery Co. is doing nothing other than availing itself of important contributions to knowledge

Both before and after the keeping test, the butter is scored by a professional grader to determine loss in score during test. No tea or coffee tester is more skilled and conscientious than the commercial butter grader. Upon his judgment rests the integrity of his company.

Housekeeping details, such as hanging salt buckets from hooks instead of setting them on wet floors and using short hoses or metal vats on wheels to transfer sterilized washing water to churns, help keep contamination of butter to a minimum.

essential to intelligent plant operation made by the bacteriologist, the chemist, the metallurgist and the physicist. They have helped to bring the operating factors of time, temperature and contamination under improved control.

These factors become adverse or destructive forces if permitted to function in a haphazard manner. A legion of dairy scientists and research workers of many of our agricultural colleges and experiment stations has made invaluable contributions to the quality control procedures of today. This newer knowledge of quality control is daily contributing to an ever-enlarging and increasingly effective practice in the manufacture of creamery butter. While engineering and technological methods are finding a broadening field of application, still other fields of endeavor are being explored. As an example, the creamery butter industry has relied upon superlative nutritional values for years as a singular characteristic which defied imitation and substitution.

The adequate quality control program of the future will undoubtedly find inclusion of the nutritional assay to be imperative. Allied food industries have already found assay analysis of their products expedient in assuring themselves of the reliable maintenance of important nutritional properties in their products.

It is well that this nutritional assay be given serious consideration. Population trends indicate that the average age of consumers is certain to increase during the next few decades. The fact that there were a million less children in school during 1938 than there were in 1930 gives evidence that some important biological influences are definitely at work. The significance to creamery butter makers is that, as the average age of the consuming public increases, we can expect an increase in the preference for quality.

Added to this population trend is the stress that advertising places on quality and which will educate the younger generation of consumers to seek it out. That education is pertinent, along with the shifting of population centers which has been taking place in recent decades. Through those shifts, urban standards of quality will be applied with a decreasing reliance upon the homespun knowledge which had its fountainhead in rural experiences of the past. The city child who has never seen butter made in the old barrel churn of an earlier day, nor tasted butter made on the farm from the cream obtained from the family cow, is having ideals set up for him that unquestionably will influence his future judgment and standards.

Filling, sealing and check weighing packages of cane sugar in American Sugar Refining Co. plant. The properties of this type of sugar are compared with the properties of other sugars in this article.

How One Sugar Compares with Another

A study of the relative values of the different commercial carbohydrates

By STROUD JORDAN

Manager, Manufacturers' Service Division, American Sugar Refining Co., New York, N. Y.

This discussion of

RAW MATERIALS

Is of interest to

All Food Manufacturers

Because it compares the properties of the different types of sugar used as ingredients in processed foods. The comparisons are revealing. Perhaps some will be at variance with your ideas, in which case you may want to write us about it.—The Editors.

APPARENTLY there is a rather general misconception that all edible carbohydrates have identical food values. This has undoubtedly arisen from the fact that the caloric values for carbohydrates, fats and proteins are set up as 4–9–4, which is a working average that has decided limitations. Even in the discussion, "Choosing Sweetening Agents in Food Manufacture," by R. S. McBride in the November, 1939, issue of FOOD INDUSTRIES, such an assumption has apparently been made. It is stated at the top of the second column on page 614: "From the dietetic value there is so little difference between ordinary sugar, dextrose, maltose, edible dextrines and a number of the others discussed below that their food value can rightfully be considered as substantially equal per pound of dry weight." While this may be the popular concept, it is not properly in accord with the facts of the case.

Starch and its isomeric forms are represented by the same generic formula, which is accepted as $(C_6H_{10}O_5)_n$. From starch and its isomers we pass directly into sugars. First among the sugars of commercial importance come the disaccharides or "double sugars," the formula for which is $C_{12}H_{22}O_{11}$. This formula is equivalent to two starch radicals that have combined with one part of water. Lactose, maltose and sucrose are disaccharides and represent isomeric forms. The molecular weight is 342 and the carbon content is 42.10 per cent of the whole. These three isomeric disaccharides may be considered in much the same light as the isomeric forms of starch. Sucrose is the most important and the main commercial source of supply.

In comparing the disaccharides, we find sugar (sucrose) to be the sweetest, most readily dissolved, and capable of forming a high concentration in water (200 parts of sugar dissolve in 100 parts of cold water). Maltose is next in the sweetness and solubility scale, while lactose is least soluble (17 parts of lactose dissolve in 100 parts of cold water) and has little or no sweet taste. Maltose is not known to exist in nature other than as a transition product but is formed when an acid or the enzyme maltose acts upon the starch molecular complex. Lactose is the sugar which is a natural constituent of milk, from which it was separated as early as 1640.

Now the disaccharides (lactose, maltose and sucrose) are capable of being further split by the action of an acid, an acid salt or enzyme to form the monosaccharides, which have the same number of carbon atoms as the original parent starch radical. But the hydrogen and oxygen content is increased so that we may consider the monosaccharides as one starch radical to which

has been added one part of water, or a disaccharide which has combined with one part of water and then split into two individual monosaccharide particles. The molecular weight of these sugars is 180, of which 40.00 per cent is carbon.

The disaccharide sucrose (sugar) when combined with one molecule of water splits into dextrose and levulose, while the disaccharide maltose splits into two dextrose molecules. The disaccharide lactose (milk sugar) takes up one molecule of water and splits into dextrose and galactose. Levulose is very soluble, but dextrose hydrate dissolves in the ratio of only 83 parts in 100 parts of cold water, as compared to 200 parts of sugar (sucrose) in 100 parts of cold water. There are other differences between the sugars, which are of commercial importance.

In the case of sugar (sucrose) we find no water of crystallization, while the commercial form of lactose attaches one molecule of water to each molecule of the carbohydrate. Maltose unmixed with dextrose is not commercially available either as a solid or as a solution in water, so it will not be considered. In the case of lactose hydrate, we find approximately 5 per cent of combined water and an obvious reduction in carbon content which places it on a par with the anhydrous monosaccharides (dextrose, galactose and levulose).

When we consider the available monosaccharides, we find that dextrose (corn sugar) is the only one offered commercially and in dry form. Any consideration of water of crystallization (combined water) would therefore be applicable only to this monosaccharide. Theoretically this combined water in dextrose hydrate ($C_6H_{12}O_6 \cdot H_2O$) is approximately 10 per cent by weight of the dry monosaccharide (dextrose). Commercially this amount of water is a maximum and rarely encountered. Generally the average combined water content may be taken as 7.5 per cent.

The polysaccharides other than starch are not of present interest. We have given due consideration to commercially available disaccharides (lactose, maltose and sucrose) and monosaccharides (dextrose, galactose and levulose). Concerning these, and starch, some interesting calculations can be made. Since glycogen is "animal starch" and the available form in the animal body, we will compare food value (energy) in pounds in terms of an equivalent glycogen poundage.

1. It requires 105.5 lb. of an anhydrous disaccharide (lactose, maltose, sucrose) to equal 100 lb. of glycogen.

2. It requires 111.1 lb. of a disaccharide hydrate [lactose hydrate ($C_{12}H_{22} \cdot H_2O$)] to equal 100 lb. of glycogen.

3. It requires 111.1 lb. of anhydrous monosaccharide (dextrose, galactose, levulose) to equal 100 lb. of glycogen.

4. It requires 120.2 lb. of a commercial monosaccharide hydrate (dextrose hydrate, 7.5 per cent water) to equal 100 lb. of glycogen.

5. It requires 122.2 lb. of a monosaccharide hydrate [dextrose hydrate ($C_6H_{12}O_6 \cdot H_2$)] to equal 100 lb. of glycogen.

Translating poundage into percentage, assuming glycogen as 100 per cent energy, we find:

Glycogen	100.00
Sugar (sucrose)	94.78
Dextrose anhyd	90.00
Dextrose (commercal)	83.17
Dextrose hydrate	81.83

If starch and its isomeric forms could be used as sweeteners, then our discussion of comparative energy values would be complete. Such is not the case, for these products have none of the characteristics of the sweet energy foods (sugars). Now in the field of sweeteners, sugar (sucrose) is usually taken as 100. With the single exception of levulose, which is a hydrolytic derivative of sugar, it is sweeter than any of the other commercial sugars. The generaly accepted averages of sweetness are as follows:

Levulose	175
Sucrose	100
Dextrose	66
Corn sirup	30

In each case the sweetness factor has been based on dry solids, except in the case of corn sirup. This product is 43 deg. Baumé, which is of a medium conversion. As the conversion increases so does the sweetness, until the sweetness of dextrose is reached, and the reverse order is found when conversion decreases.

When energy (caloric) values are considered, it will be quite obvious that the disaccharides (lactose, maltose, sucrose) will show a figure greater than the monosaccharides (dextrose, galactose, levulose). Of course, this assumption is based on the anhydrous varieties of each individual type. Wherever water is present, either combined or free, a lowered energy (caloric) value will result.

The disaccharides show a carbon content of 42.10 per cent; the monosaccharides, 40.00 per cent; the hydrated disaccharides, 40.00 per cent; and the hydrated monosaccharides fall as low as 36.36 per cent, with a commercial average (7.5 per cent water) of 36.96 per cent. Energy (caloric value) is directly proportional to carbon percentage, so this is a vital factor in our subsequent calculations.

Browne ("Handbook of Sugar Analysis," 1912) reports a calorie equivalent of 3.9552 for sucrose and an average value of 3.7500 for invert sugar. The *Journal of Research* of the U.S. Bureau of Standards **2**, 388, 1929) reports the gram-mole calories for sucrose as 1349.6, which is equivalent to 3.946 calories per gram. Atwater and Snell (*Journal Am. Chem. Soc.*, **25**, 659) calculate the specific heat of combustion of cane sugar (sucrose) as 3959 small or 3.959 large calories. Sherman ("Food and Health" 214, 1935) reports sugar as having 1815 calories per pound, which is equivalent to 4.000 calories per gram. The "Encyclopedia Britannica" (14th ed.) reports an equivalent of 4.1 calories per gram for refined sugar.

It is rare to find calorie equivalents set up in available literature for the several individual sugars. Table I should therefore be of immediate interest.

In comparing caloric values of the hydrated monosaccharides and disaccharides we find 155 more calories per pound in the disaccharides. The disaccharide sucrose (sugar) forms no hydrate and contains but traces of water in the standard commercial form. It shows 1794 calories per pound, which

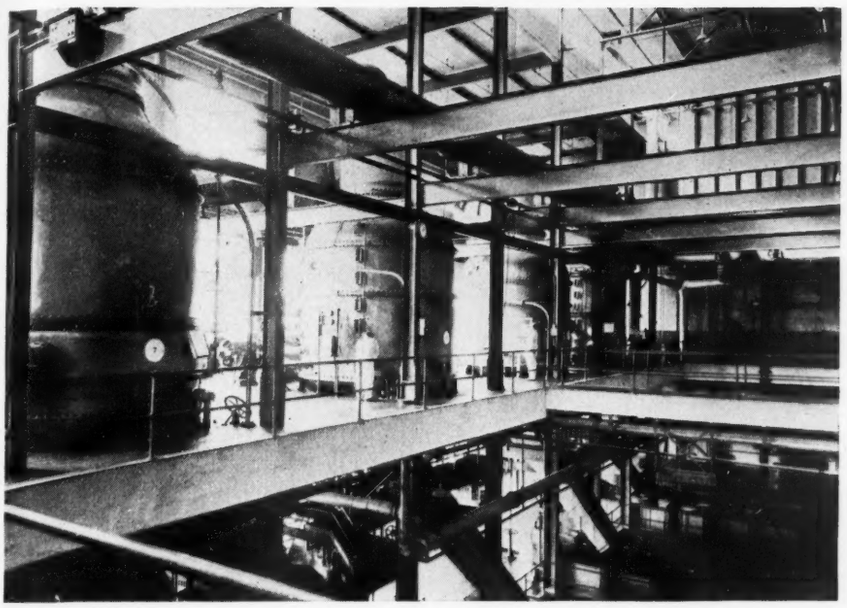
Table I—Caloric Equivalents of Sugars

Carbohydrates	Theoretical large calories [1]	Theoretical pound calories [1]	Browne's experimental values [2]	Bureau of Standards values [3]
Starch ($C_6H_{10}O_5$)n	4.175	1894	4.1825	4.1788
Inulin ($C_6H_{10}O_5$)n	4.175	1894	4.1335	4.1599
Glycogen ($C_6H_{10}O_5$)n	4.175	1894	4.1906	4.1868
Lactose ($C_{12}H_{22}O_{11}$)	3.955	1794	3.9515	3.9497
Lactose ($C_{12}H_{22}O_{11} \cdot H_2O$)	3.757	1704	3.7368	3.7352
Maltose ($C_{12}H_{22}O_{11}$)	3.955	1794	3.9493	3.9497
Maltose ($C_{12}H_{22}O_{11} \cdot H_2O$)	3.757	1704	3.7218	3.7200
Sucrose ($C_{12}H_{22}O_{11}$)	3.955	1794	3.9552	3.9461
Dextrose ($C_6H_{12}O_6$)	3.757	1704	3.7426	3.7388
Dextrose ($C_6H_{12}O_6 \cdot H_2O$)	3.416	1549	.....	.....
Levulose ($C_6H_{12}O_6$)	3.757	1704	3.7550	3.7405
Galactose ($C_6H_{12}O_6$)	3.757	1704	3.7215	3.7227

[1] 3.955 assumed to be an average value for sucrose. Calculations are based upon the varying carbon percentages in each individual molecular structure of the several sugars.

[2] Reported in " Browne's Handbook of Sugar Analysis," 319, 1912.

[3] Values obtained from the Bureau of Standards (U.S.) *Journal of Research*, **2**, 2, 388, 1929, by dividing gram-mole calories by the accepted molecular weight in whole numbers.



Pan house in plant of American Sugar Refining Co. Sugar sirup is concentrated in these vacuum pans.

is an energy increase of 90 calories when compared with the anhydrous monosaccharides, as represented by dextrose. This value increases to 245 calories per pound in favor of the anhydrous disaccharides, as represented by sugar (sucrose), when compared with the hydrated monosaccharides (9.09 per cent water basis), as represented by dextrose hydrate. Even in the commercial form of dextrose hydrate we find 217 less calories per pound (7.5 per cent water basis), which is equivalent to a decrease in energy (caloric) value of more than 12 per cent when compared with commercial sugar (sucrose).

Now one may logically question a comparison of caloric equivalents unless it can be shown that such equivalents are equally available. Such a question has led to much dietary speculation and an almost endless round of experiments in carbohydrate metabolism. It has even reached the point where dextrose is sometimes accredited very special properties and set up as the natural sugar. It is also designated as the energy sugar, the muscle sugar and the physiologic sugar. This would imply that all other carbohydrates, and especially sugars, are not as acceptable. In reviewing such statements and claims in the *Journal of the American Medical Association,* February 13, 1937, two particular statements and the conclusions drawn concerning this whole matter by the Council on Foods are apropos:

"Because dextrose is absorbed as such and circulates unchanged in the blood stream, it has been supposed that it would be absorbed quickly and with no effort on the part of the body because it requires no enzymic process to make it suitable for absorption. Certainly dextrose is not as rapidly absorbed as the advertisements of some manufacturers would lead the uncritical reader to believe. Dextrose must be in solution and must reach the duodenum before it can be absorbed, since absorption does not take place from the stomach. Experimental evidence does not indicate that the rate of absorption of dextrose is significantly more rapid than that of many other carbohydrates of physiologic importance."

Following this will be found much interesting evidence as to the acceptability of carbohydrates as a class. And finally, experiments on the relief of muscular fatigue and conclusions drawn concerning this whole carbohydrate comparison will be of interest.

"More recently Bøje determined the blood sugar concentration as part of an investigation into the physiology of severe exercise. He found that subjects who had previously subsisted on a high fat diet developed hypoglycemic symptoms during extraordinarily severe work much sooner than they did when subsisting on a high carbohydrate diet. The blood sugar could be quickly brought up to normal levels and the symptoms relieved by the administration either of dextrose or of sucrose by mouth.

"Dextrose is a sugar found in many natural products or incorporated in different fabricated food mixtures. It is also being produced in pure form in large quantities. Its sweetness is about 75 per cent of that of sucrose. Dextrose should not be termed the physiologic sugar, for such designation permits the connotation that dextrose is a preferred food, which is not compatible with known facts. Although dextrose requires no hydrolytic changes in the alimentary tract to prepare it for absorption, it is incorrect to state that it is instantly absorbed. Dextrose is well utilized as a food, but it possesses no practical advantages over many other carbohydrates in combating ketosis produced by either a high fat diet or by fasting, nor does dextrose itself have unique advantages when administered by mouth to prevent or relieve fatigue or to maintain muscular efficiency to a high degree. Dextrose is produced by the digestion of the most important dietary carbohydrate, starch. The evidence which indicates any superiority, under normal conditions, of dextrose ingested as the free sugar over dextrose ingested as the polysaccharide starch is not convincing."

Derivation of carbohydrates as a class, comparison with the parent starch radical, carbon content, sweetening ratios and energy (caloric) values give us enough data for required use in the building of a food product to a definite and desired value. There remains but a general consideration of physical properties to make our story complete. To this end it may be stated that sweetness of any sugar is generally proportional to its solubility, perhaps due to the fact that the greater the potential concentration the more intense the effect. This deduction is applicable only in a general manner, for sweetness is a sensation that varies with the different types of sugars. It is not believed that any individual with an average taste would accept equal sweetness as being the same in two or more sugar solutions, each representing an individual sugar, even though intensity is comparable. Sugar (sucrose) has a clear, neutral sweet taste that is somewhat modified in any of the other sugars, whether they be disaccharides or monosaccharides.

Another important consideration has to do with viscosity and osmotic pressure. In general it will be found that the larger the molecule the greater its viscosity when in solution and the lower its osmotic pressure. So we find the polysaccharides, disaccharides and monosaccharides decreasing in viscosity and increasing in osmotic pressure in the order in which they have been named. This means that a comparable solution of starch is thicker than a solution of sugar (sucrose) and that a solution of sugar is thicker than a comparable solution of dextrose. When these facts are coupled with the further fact that sugar (sucrose) is more soluble than dextrose, it will be obvious that a solution of dextrose can not be made that will have as high a viscosity, degree of sweetness or energy value as is possible with sugar (sucrose), when compared on an equal concentration basis. Nor is it possible to prepare a solution of these less sweet and less soluble sugars individually that will be equal to heavy concentrations of sugar (sucrose), since an increase in poundage that is sufficient to give comparable sweetness is not always possible of solution at ordinary temperatures.

Performance Data Determined For New Food Freezing Plant

Freezing of lima beans, poultry and packaged products studied

By WILLIAM J. FINNEGAN
Consulting Engineer, Los Angeles, Calif.

This is an article on
QUICK FREEZING

It is of interest to processors of

Fruits, Vegetables
Meat, Fish, Poultry

Because it presents operating data on freezing which are not readily obtainable elsewhere, and it discusses innovations and principles which contribute to economy and high quality in freezing—The Editors.

Part II

THE overall loss of product weight was also investigated.* Normal quantities of wet lima beans were taken from the water flume, carefully weighed and arranged on trays, approximately 4 lb. per square foot of tray area. The trays were promptly put into the freezing racks and conveyed through the freezing tube. Then the frozen beans were emptied into the individual bean separator which prepared them for filling into packages. At a point where the beans are normally packaged, the weights were carefully noted on all quantities being tested.

The tabulations showed that the overall loss of product weight from the inspection belts to the package filler averaged 1½ per cent.

Eviscerated chickens varying in weight from 1¾ to 2½ lb. were dried with absorption paper and arranged on freezing trays, breast up, averaging approximately 80 lb. per tray. All poultry was frozen with the same air temperature but in four different ways: (1) Unwrapped and placed on the trays with breast up. (2) Wrapped in transparent cellulose and placed on the trays with breast up. (3) Unwrapped and placed between aluminum tubes with breast up. (4) "Cryo-Vac" wrapped and placed between aluminum tubes, breast up. Turkeys averaging 12 lb. were also frozen without wrapping by placing the birds directly on the trays, breast up.

The initial temperature of the birds averaged 68 deg. F. The average freezing air temperature was –18 deg. F. Temperatures were taken every 15 minutes (following a 2 hour freezing period) from a thermometer which penetrated into the breast of the larger birds and in close proximity to the final freezing point.

Weights of the unwrapped birds were carefully checked immediately before they entered and promptly following their discharge from the freezing tube so that any loss of weight due to dehydration during freezing could be accurately ascertained.

Chickens treated by the third and fourth freezing methods were frozen to –5 deg. F. in 2 hours and 45 minutes. Those treated by the first freezing method were frozen to 0 deg. F. in 3 hours and 15 minutes. And those treated by the second freezing method were frozen to –2 deg. F. in 4 hours. Turkeys were frozen to 0 deg. F. in 3 hours and 30 minutes.

Trays of unwrapped chickens which were carefully weighed prior to and following the freezing process were of equal balance in each instance. Therefore, no measurable amount of loss in weight could be found by this method of testing about 240 lb. of chickens. Moreover, a careful examination did not disclose any signs of desiccation.

Cut blanched green beans (French style) were packed in 2½ lb. heat sealed, transparent cellulose bags, placed in a standard paraffined paper box, size 5⅛ x 10 x 2 in. The cartons were wrapped and sealed with a moisture-vapor proof wrapping.

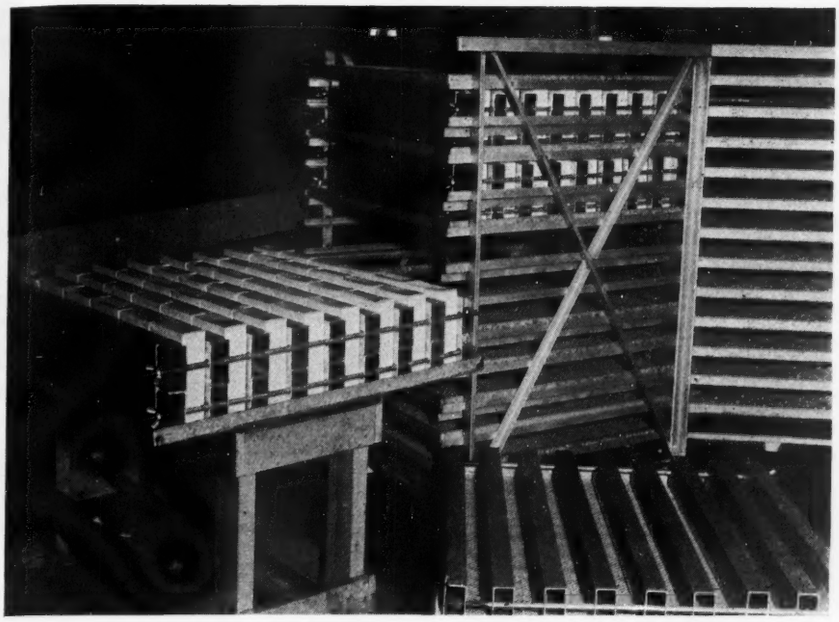
All produce was frozen within the cartons with the same air temperature but in two different ways. First, the broad sides of each carton were in pressure contact with a metal surface; second, cartons were arranged on freezing trays with only the bottom broad surface in contact with an open mesh screen. The average ammonia pressure was 2 lb.; the average air temperature, –22 deg. F. Bean temperatures were taken every 15 minutes from thermometers penetrating the center of the carton.

Beans treated by the first freezing method were frozen to 0 deg. F. in 2 hours and 30 minutes. Beans treated by the second freezing method were frozen to –2 deg. F. in 3 hours and 30 minutes.

Since French style green beans are

Products to be frozen loose, or unpackaged, are placed in trays, which are carried through the freezer on trucks.

*The overall loss in weight should not be confused with the loss in weight due to dehydration. For instance, the overall loss in weight includes the weight of the free ice and snow which normally adheres to the trays after the frozen product has been removed. It also includes the weight of free ice and snow separated from the beans in the individual bean separator, as well as other unavoidable losses which are not caused by dehydration. These commercial tests indicate that the overall loss in weight from wet lima beans and the like may be approximately accounted for by allotting one-half of 1 per cent for dehydration and 1 per cent for other unavoidable losses.



Packaged products are frozen more quickly in Finnegan air blast freezer when placed between aluminum conductor tubes. The conductors and packages rest in trays which are conveyed through a freezing "tube" or tunnel on trucks.

generally known to be a difficult product to freeze and must be frozen rapidly to maintain quality, they were selected to indicate the results attainable with other packaged products.

On several occasions the freezing apparatus was operated continuously for more than 20 hours without defrosting. No difference in the freezing capacity or time required to freeze the product was observed during the last hours of these freezing periods. The following data are taken from the tests conducted to demonstrate the time required for defrosting the freezing apparatus: Total time consumed for defrosting all heat transfer surfaces, 21 minutes. Total time consumed from stopping to restarting of the freezing operations, 31 minutes. A full hour is recommended for the defrosting period.

The freezing unit was completely "secured", that is, prepared for a complete and safe shutdown for a long period after defrosting. The ammonia pressure was 70 lb.; the ammonia temperature, 47 deg. F. A period of 6 minutes was required to reduce the ammonia pressure in the freezing unit to 15 lb., with an accompanying ammonia temperature of –1 deg. F. and a recirculating air temperature in the final freezing stage of 0 deg. F., after which the normal freezing operations were started.

Freezing operations were proceeding under normal conditions while freezing lima beans. These conditions existed: ammonia pressure, 10 lb.; ammonia temperature, –8.4 deg. F.; final air temperature, –7 deg. F.

The stoppage of processing operations prior to freezing necessitated a shutdown of freezing operations. A 2 minute period was required to close the suction and liquid valves and shut down the fans, thereby securing the freezing for a shutdown period of from 1 to 6 hours. Long shutdowns require approximately 1 hour for defrosting and completely securing the freezing apparatus.

The quality of frozen foods may be undesirably affected by numerous conditions to which the food is subjected during freezing. For example, the freezing apparatus may lack the necessary flexibility required to obtain a freezing speed known to be desirable for some foods. The apparatus may lack sufficient flexibility for suitable handling or freezing of some foods in the form desired by the trade. Contamination may result through utilizing a freezing medium which is difficult to keep clean or by using freezing equipment which cannot be properly cleaned and sterilized. Impairment of appearance and texture of the food surface may be caused by desiccation during freezing. Abrasion of the food surface and other mechanical injury may occur. The freezing medium may cause undesirable penetration or dehydration through the action of osmosis. Surface fracture and possibly internal damage of some foods may be caused by subjecting the food to a large difference in vapor pressure during the freezing process.

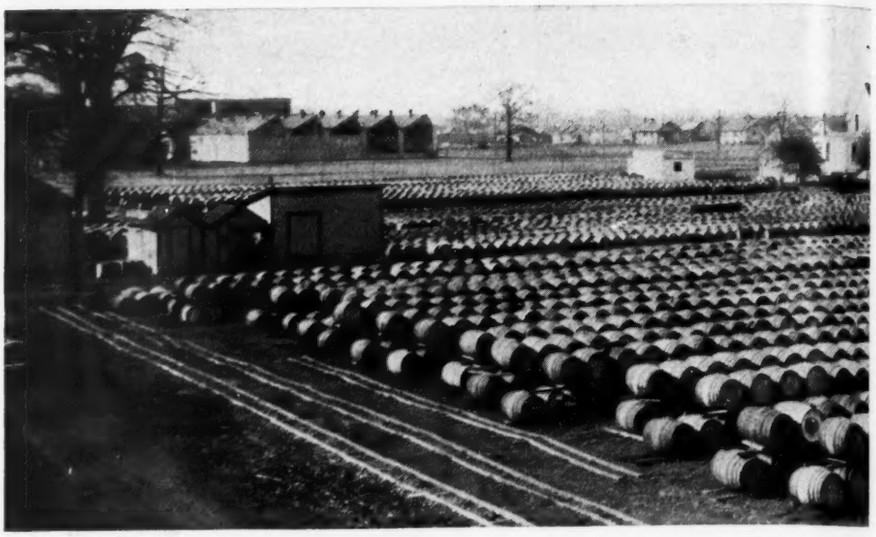
From a practical and economic standpoint it is impossible to incorporate all of the desirable features in a freezer required to handle and freeze a wide range of products, either individually or in a variety of packages. However, it is possible to provide facilities which will closely approach the fulfillment of certain requirements while wholly meeting the more desirable conditions.

For instance, the basic principles embodied in multistage freezer design permit the changing of handling facilities or freezing tube adapters as required to suitably handle various kinds of foods or containers, while subjecting such foods or containers to a very desirable condition of accelerated heat exchange. The speed of freezing may be hastened or retarded as required for increasing the freezing capacity, improving the quality of certain foods or maintaining economical freezing operations. The use of air as a secondary freezing medium precludes the possibility of food contamination, since all food handling equipment is thoroughly cleaned and sterilized after each freezing operation. The deteriorated appearance and material loss in salable weight resulting from dehydration is practically eliminated.

THE importance of flexibility in food handling and freezing facilities is frequently overlooked until the fixed charge on two, and in some instances three, separate freezing systems prompts the producer to give more thought to his production costs. Likewise, the cost of power and labor is gradually receiving its deserved attention. The effect of these factors on the overall production cost will become more and more important as this cost becomes more closely related to the profit margin, and this is sure to become uncomfortably narrow for some procedures as the price of frozen food is reduced, which seems certain.

A thorough treatment of frozen food production costs in itself requires more space than allotted here. However, if the industry is to benefit by the recent progress in production economy, many producers will need a competent engineering survey of their individual operating problems to eliminate or minimize the losses due to lack of efficiency.

The major factors considered in the design of the Dulany freezing plant were sanitation, food quality, flexibility and economical operation. While operating costs occupied fourth position in relative importance, a look at the operating data will disclose that unusual economy was attained. Moreover, flexibility has a very important bearing on the overall operating costs.



How To Make Dill

Practices based on a lifetime of experience in the business of making pickles

By W. G. WORMLEY
Hayward, Calif.

AS a general principle, the production of pickles is a two-stage process. First comes the salting in brine, which involves the fermentation and cure. Then comes the conversion of the brine stock into the edible products which the consumer knows as pickles. The reason is that brine pickles are an intermediate product and are not to be considered as edible because of their extremely high salt content, ranging in the vicinity of 20 per cent of salt.

An exception to the general principle is to be found in the production of genuine dill pickles. The word "genuine" is used to differentiate this historic method of producing dill pickles from another method of more recent origin by which processed dill pickles are made from brine pickles. The latter will be discussed in a future article.

Genuine dills are the product of the salting station, not of the finishing or processing plant. This pickle represents a high point in the art of pickling and is a semiperishable product. Because of its perishability and because it is produced by temporary help, usually with little or no previous experience, the production requires careful supervision. To make the best quality dill pickles each step must be followed with exacting care. Yet, even with all possible care, the dills may have a shorter merchantable life than is normally to be expected.

The first step in making genuine dills is to provide a clean, sterile tank or olive cask in which the cucumbers are to be washed. Sterilization is accomplished by methods previously described for the production of salt stock (FOOD INDUSTRIES, October, 1939, page 552). This tank should be filled with clean fresh water to about two-thirds of its capacity. When making dills the wash water must be changed frequently—several times a day—for two important reasons: (1) To wash off any mud or dirt that may be adhering to the cucumbers; (2) To wash off bacteria that come in from the fields, for certain types of soil organisms may be conducive to spoilage. It is recognized, however, that this source of harmful bacteria is of less importance than badly contaminated spices.

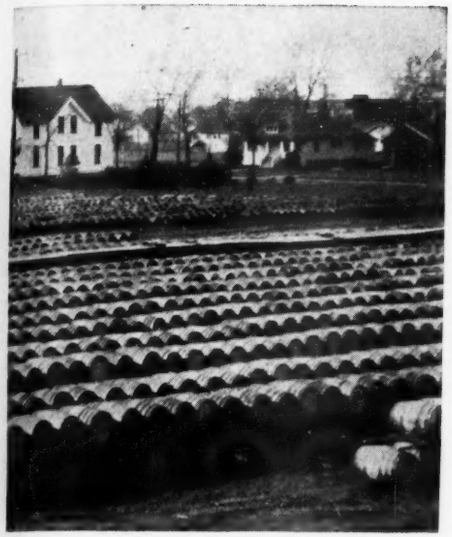
A good supply of 28 deg. salometer brine should be made up in advance and should be kept ready at all times so that its temperature will be the same as the air temperature. Follow the method of making and holding the brine that was previously described for the production of brine pickles or salt stock (FOOD INDUSTRIES, October, 1939, page 552). Test the brine frequently with the salometer to be sure that the strength remains constant at 28 deg. sal. If it deviates from this figure, then add more strong brine or water as indicated, mix thoroughly and test again.

The size of cucumbers used for making dills is usually the No. 2, or large size. These are generally from 4 to 5 in. in length. Nubbins and crooked cucumbers — called "nubs" and "crooks" for short, or N. & C's.— are also sometimes made into genuine dills. Whether to salt or to dill the nubs and crooks depends on market prospects and the plans of the sales department.

At this point it should be emphasized that a genuine dill is an item that has a short merchantable life. And it cannot be converted into other types of pickles that have the longer merchantable life associated with pickles pro-

More to Come

In a previous series of articles, "Forty Years of Pickle Salting," appearing in the September, October, and November, 1939, issues of FOOD INDUSTRIES, Mr. Wormley gave practical directions and formulas for the production and care of brine pickles or salt stock. In this article he writes from long experience about the production of dill pickles. Future articles will cover the "finishing" of pickles, that is, the conversion of brine pickles into edible finished products.



"A Few Dill Pickles." Quite a few, in fact. This picture was taken alongside one of the plants of H. J. Heinz Co. Good genuine dills are made in tightly closed barrels, not in vats or vented barrels. The author tells how and why.

Pickles

duced from salt stock. So it is imperative to decide wisely on whether to produce salt stock or genuine dills from nubs and crooks.

Genuine dills are normally produced by a rapid fermentation and cure in barrels. Occasionally they are made in tanks, usually with very indifferent success. Good, new 45 gal. barrels (tight oak cooperage) well coated inside with a flavorless grade of paraffin should be procured or prepared well in advance of the active salting period. Much time, needed for other work in the busy season, will be conserved by having the cooperage ready and in perfect condition in advance of the rush.

A great many pickle packers use secondhand cooperage—empty whiskey barrels are the normal source of secondhand tight cooperage. But in my own experience I have found that money is saved by the use of new cooperage, despite the lesser initial cost of the secondhand whiskey barrels. One of the factors on which this finding is based is the fact that secondhand barrels may vary in size. The so-called 45 gal. barrel may be of 46, 47 or even 50 gal. capacity. To identify a barrel that is only one or two gallons oversize is not easy. Yet as a practical matter the formula requires filling the barrel with cucumbers and brine. Thus these two ingredients are measured by the volume of the barrel whereas the others are accurately measured or weighed. So dills made in oversize barrels will suffer a slight dilution of the dill, spice and vinegar flavor. This is the opposite of good quality control.

Before the actual salting of dills begins, weigh out several 9 lb. portions of salted dill weed into small boxes, wooden trays or buckets. But weigh out only enough ahead to keep the packers supplied. If the salted dill weed is exposed to the air for any length of time, small flies are attracted to it, and it will become insect contaminated.

The washing tank is now two-thirds full of clean water. Dump the green cucumbers into this water as rapidly as they are received from the growers, provided there are enough on hand to fill a barrel. Otherwise, hold them dry until enough are received. Wash the cucumbers thoroughly by agitation with a large wooden paddle that has smooth, rounded edges.

In the meantime, have several 45 gal. barrels ready, with one head carefully removed. Never mix up the barrel heads, especially if you are using secondhand cooperage. And it is a wise procedure to mark the head and the barrel in such a way that the head can be replaced in exactly the same position as before it was removed. In this way the possibility of troublesome leaks is minimized.

It is assumed that you have on hand the necessary cooper's tools (mallet, driving iron, flagging iron and flag) as well as new bungs, burlap and a bung starter. The flag is the leaf of the flag plant, which is dried and used for plugging possible leaks in the barrels. The necessity of using it illustrates the economy of new cooperage. And if you are using old cooperage, be sure to have on hand a number of extra barrel hoops of the proper sizes to replace any that may break.

Into a 45 gal. barrel place (on the bottom) one-third (3 lb.) of the salted dill weed previously weighed out into 9 lb. lots. Then, with a dip net, half-fill the barrel with washed cucumbers from the wash tank. This will bring the level of the cucumbers to the bung. At this stage, be sure to shake down the barrel well.

Then add another one-third (3 lb.) of the dill weed and 6 oz. of mixed dill pickle spice. Next, completely fill the remaining space in the barrel with washed cucumbers, and again be sure to shake the barrel down well. On top of the pickles place the remaining third (3 lb.) of the weighed salted dill weed, and add the remainder of the mixed dill pickle spice (6 oz.).

Now replace the head tightly in the barrel. Lay the barrel on its bilge, bung side up, and remove the bung. Through the bung hole add 2 qt. of 100 grain vinegar and 2 qt. of dill weed brine. Then fill the barrel, through the bung hole, with 28 deg. sal. brine. Replace the bung tightly in the hole and inspect the barrel for leaks. If any leaks are found, they must be closed by driving the hoops tighter or by flagging, or both. Mark the date on the head with chalk or crayon.

Now roll the barrel at least 100 ft. to insure mixing of the liquid contents. On the following day, roll the barrel 100 ft. more. And on the third day, again roll it 100 ft. This makes a total of 300 ft. of rolling and must be done on successive days. This rolling is of great importance and must be carefully supervised. One way to avoid missing or mixing the barrels during rolling is to mark the date on the head of the barrel immediately after it is rolled. The importance of proper rolling of the barrels cannot be overstressed. It must be done on schedule, but inexperienced workers are apt to slight it because they do not comprehend the need for remixing the contents of the barrels on three successive days.

When the rolling has been completed each day, the barrels should be stored on their sides, *in the shade*, at a uniform temperature of about 70 deg. F. If it is necessary to store the barrels in the open where the sun may strike them, they must be covered

Formula for Packing Genuine Dill Pickles

Drained salted dill weed	9 lb.
(Or 6 lb. of new green weed, unsalted)	
Mixed dill pickle spice	12 oz.
Vinegar, 100 grain, distilled	2 qt.
Dill weed brine	2 qt.
Cucumbers, washed, green	225 lb.
Salt brine, 28 deg. sal	To cover

Yield, one 45 gal. barrel

Mixed Dill Pickle Spice Formula[1]

Cinnamon, broken and sifted saigon	30 lb.
Cloves, whole	27 lb.
Allspice, whole	27 lb.
Red chili peppers, small	8 lb.
Bay leaves, unbroken	8 lb.
Total	100 lb.

[1] Mix well.

with boards to protect them from excessive temperatures.

Normal curing time is six to eight weeks, depending on the uniformity of the day and night temperatures and of the day to day temperatures.

It is important to shake the barrel during the filling operation. If this is not done, the full weight of 225 lb. of green cucumbers cannot be packed into the barrel. This, in turn, will result in nonuniformity of flavor, will waste some of the salt, spice, vinegar and weed and will utilize more barrels than necessary. It will also increase the shrinkage at repacking time, piling up transportation costs.

A violent fermentation takes place in the barrels. Because of it, some packers drill a 1 in. vent hole in the top end of each dill barrel and store the barrels on end instead of on the bilge. This hole is kept closed with a 1 in. tapered wooden plug which is removed from time to time to relieve the gas pressure in the barrel. After the fermentation has subsided, the lost brine is replaced with 20 deg. sal. brine (not 28 deg. brine) and the plug driven firmly into the vent. The barrel is now stored us usual to complete the cure.

Genuine dills may also be made in open tanks by using the same proportions given in the formula for barreled dills.

Dill pickles made with open vents in the barrels or those made in open tanks are very inferior in quality to those made in tightly closed barrels. This inferior quality is due to the fact that flavor and the lactic acid produced by fermentation are lost by volatilization, evaporation or foaming over. Tank dills are little better than low-brine salt stock.

Kosher Style Dills

Kosher dills are nothing more than genuine dills with the flavor of garlic added. If you are positive that your customers will buy real kosher dills, they can be made by merely adding two small garlic heads, chopped fine, to the contents of the barrel when packing. The chopped garlic should be scattered throughout each barrel. The rest of the formula remains the same as for genuine dills.

But, if you are not sure that your customers will purchase kosher dills, it is far wiser to produce only genuine dills in the regular way. If any kosher dills are needed, they can be made at repacking time by adding sufficient garlic vinegar to produce the flavor desired.

Garlic Vinegar Formula

Place into a clean 45 gal. barrel 15 lb. of finely chopped fresh garlic. Through the bung, fill the barrel with 100 grain distilled vinegar. Bung the barrel tightly. Let the vinegar age for 30 days. It is then ready for use.

One fluid ounce of this garlic vinegar will give a slight garlic flavor to the entire contents of a 45 gal. barrel of genuine dills. Larger additions will, of course, produce a stronger garlic flavor.

Repacking Dills

After the curing of genuine dills is complete, they must be repacked in barrels. To do this, open the heads with customary care, and do not lose any of the brine. Dip the pickles out with a net onto wooden inspection tables. Here they are gone over very rapidly, usually by girls, to remove any hollow pickles that may have formed, or any broken ones. They may also be graded here for sizes.

Fill up the same barrels as far as possible. It will be necessary to add some pickles from other barrels to compensate for shrinkage caused by the osmotic action of the brine and to replace any pickles that may have been thrown out on inspection.

Shrinkage can normally be expected to run about 20 per cent from all causes. This means that out of every ten barrels which you repack, you will get only eight barrels of merchantable dills. Use the original brine from the two remaining barrels for any needed rebrining of repacked dills. But always follow the policy of keeping the dills and their original brine together as far as it is possible to do so.

Labor costs in packing genuine dills should not exceed $0.50 per 45 gal. barrel. In repacking, the labor cost for this operation and for preparing for shipment should not exceed $0.50 per 45 gal. barrel of repacked goods ready to load on cars or trucks.

Overnight Dills

We hear much talk of "overnight" dills, and the impression is sometimes created that they are much different from genuine dills. While it is true that nearly every pickle packer who attempts to make "overnights" varies the spice and garlic content of his formula to produce a distinctive flavor for this type of pickle, it should be realized that "overnight" dills are really only partly cured dills which are marketed at the time when the fermentation and cure have had only a good start. Therefore, they have a fresh cucumber flavor in addition to high spicing.

These so-called overnight dills cannot be packed in closed barrels but are delivered in open containers by truck.

Spoilage Problems

Recent investigations into the causes of pickle spoilage, notably those carried out by Prof. F. W. Fabian of Michigan State College, are throwing much light on the various causes of spoiled pickles. However, little commercial experience has yet resulted from the application of his discoveries. Their significance to the packer of dill pickles is that the normal spices of commerce are often heavily loaded with bacteria of the kinds that will induce spoilage. From these investigations it appears that sterile spices (sterilized by fumigation) may ultimately be a necessity for all pickle salters who pack dills.

All genuine dills in barrels are semiperishable. This perishability can be markedly reduced by packing in cans, pasteurizing and promptly cooling—a procedure that does not yet seem possible in bulk. Ordinarily, bulk dills will be merchantable for periods of from three to five months. Sometimes cold storage is proposed for extending this marketable life. It has been tried many times in a haphazard fashion and without success. The reason for these failures seems to lie in the fact that packers wait until the end of the merchantable life of the dills before deciding to store in the cold. By this time the dills have become quite soft and have lost all their natural crispness. Cold storage cannot contribute any improvement to their texture, and hence the practice has received considerable adverse criticism.

If cold storage is ever to be successfully utilized for keeping bulk genuine dills, it would appear that only first class pickles should be cold stored. And the storage should begin *immediately* after the 6 to 8 week curing period is complete. Perhaps the dills should be cold stored as soon as the fermentation has died down, even before the cure is at all advanced. There can be no possible commercial advantage in waiting until the pickles are almost unmerchantable and then act to prevent further deterioration.

On the other hand, cold storage even at 35 deg. F. is fairly costly. And genuine dills are not only in competition with processed dills (to be described later) but they can be preserved by canning and pasteurization. So, the economics of the situation are somewhat against the possible use of extensive cold storage for the preservation of genuine dill pickles. Nevertheless, I believe that the possibilities of cold storage in this field have never been adequately and scientifically explored.

Technology's Effect On Food and Packaging

It is creating new opportunities—destroying old ones—for the food and package manufacturer

By IVAN C. MILLER,
Distribution Editor,
FOOD INDUSTRIES

The large volume of consumer and institutional packages in which processed cheese reaches the market may be credited mostly to the technological application of pasteurizing as a means of cheese preservation.

TECHNOLOGICAL developments in the food industries place new demands upon the package. And new developments in packaging open new avenues of opportunity to the food manufacturer. Developments in other fields affect the stability of both. Neither food manufacturer nor package manufacturer can afford to slumber complacently because of today's accomplishments. Tomorrow will bring a change which must be met by both. Both must keep on top of change and progress.

Before the development of packaging machinery, most food manufacturers packaged in bulk. Almost all packaging for the consumer was done in retail outlets. Package machinery has made possible an enormous expansion in the packaging of foods—by the manufacturer for the consumer. As the result of manufacturer packaging, the market for bulk packaging materials has been reduced. This is an advantage to package manufacturer, distributor and consumer.

It would be impractical, if not impossible, for retailers to carry in bulk a stock of all the food items now offered in consumer packages.

The old-time grocery store bought dried fruits and vegetables, sugar, coffee, tea and flour in bulk and packaged them for the consumer in the retail outlet. Though this is, to a limited extent, common practice today, such items as corn flakes and cake mixes would not be on the grocer's shelf were it not for package machinery—which has made possible the development and marketing of many important food products.

In a like manner, technical developments in food processing have on many occasions opened up new fields for both new and old package materials. Technical developments have on occasion also brought about a reverse condition. When the refrigerator car came into use, more than 60 years ago, a potential market for packing materials was minimized in importance. Had no provision been made for widespread distribution of fresh meats through the use of the refrigerator car, a larger meat volume would be processed and packaged.

Sometimes the package comes into its own so long after a technical development in food processing that the benefactor passes unnoticed. The present consumer package for eggs, which accounts for a huge volume of egg sales and represents an important market for packaged materials, did not develop until many years after the introduction of egg candling. This development marked a technological advance in the egg industry when it was introduced. It is doubtful whether the volume of package material which goes into present-day consumer egg cartons would be possible were it not for "candle" grading of eggs.

It was many years after Louis Pasteur reported his findings that pasteurization was applied to cheese. It was more than 40 years after Pasteur's discovery that pasteurized young cheese, processed and homogenized, became a volume item packaged in consumer containers. This marked an innovation in cheese distribution. Cheese reached the retailer less and less in daisies, packed in round wooden boxes, and more and more packaged for the consumer in small packages. One package material has gained a market at the expense of another.

The introduction of hydrogenated shortening wrought havoc with the domestic consumption of lard. This change reduced the demand for conventional domestic lard containers. At the same time a new demand was created for the container adopted by the shortening manufacturer.

Frozen foods have been on the market for ten years. In that short time frozen foods have disturbed the equilibrium in both food and packaging industries. The fresh fruit and vegetable industry has felt the effect of this new industry and has fought back with the aid of new technic, new packaging. One of the oldest and

most stable food industries, the canning industry, has also felt the competition from frozen foods. Some canners have faced this competition by including freezing in their operations. Both canners and can manufacturers, aware of the threat, are busy in laboratories and in pilot plants improving canning technic and adapting canning and the can to quick freezing.

Freezing has put many bulk foods in packages—millions of pounds of fish fillets in consumer packages, wrapped in transparent cellulose or parchment inclosed in folding cartons. Formerly, fish, mostly distributed as "rounds," moved out to the trade in barrels, crates and wooden boxes. An appreciable volume of processed fruits and vegetables now comes to market in new type containers—paper cartons. Poultry is packaged in Latex bags. What the final effect of this industry will be on food manufacturers and packaging is not yet apparent. This development will, nevertheless, warrant careful watching.

IMPROVED food technology has created new markets for packaging. Packaging developments have opened markets for food, too. In recent years one branch of the meat packing industry has profited from the use of an improved package material. The market for frankfurters, bologna and other prepared meats has expanded since casings made of intestines have been partially replaced by casings made of transparent cellulose.

Both transparent cellulose and polymerized rubber have created new package opportunities for food manufacturers. At the same time, both have invaded the fields of other package materials. Many of the foods which remained bulk items until but a few years ago—dried fruits, dried peas, beans and so forth—are now to a large extent packaged items. Packaging them in transparent, consumer size bags has greatly increased sales.

Polymerized rubber has had many recent applications as a package material. Successful results are reported by users of the material for coffee. The coffee is in a polymerized rubber-lined bag in an atmosphere of carbon dioxide (Food Industries, January, 1940, page 42). The development is too new to foreshadow the ultimate effect of this application of the material on the consumer market for coffee —on the market for either the food product or the package material.

When from the laboratories came the results of exhaustive research in the application of carbon dioxide in packaging, the way was opened for new and better packaging of foods. Soon a large volume of coffee went into the vacuum can. Also, the life of packaged coconut was extended. Further, one of the leading nut industries owes its existence to the application of the laboratory results of investigations of food preservation with carbon dioxide. The increased consumption of cashew nuts, which according to the Census of Manufacturers increased in volume from 4,079,000 lb. in 1930 to 26,884,000 lb. in 1937, was possible only because of packaging in an atmosphere of carbon dioxide.

Developments in other industries have often paved the way for profitable developments in the food industries. Packaging also has profited. According to the Census of Manufacturers, the sales volume of consumer packaged ice cream powders in 1931 was $254,000—by 1937 the sales had reached $2,271,000. No market would exist for ice cream powders, or for the containers in which they are packed, were it not for the development of the mechanical refrigerator with its freezing compartment.

The mechanical refrigerator not only opened markets for new foods and new packages but invited changes in package material and package design. The size and shape of many food containers have been altered to fit the requirements of the mechanical refrigerator, rewarding those who recognize the need for change, penalizing those who lag behind.

Only a few years before the introduction of the mechanical household refrigerator, the mechanically refrigerated ice cream cabinet began to displace salt and ice cooled boxes for the storage of ice cream in retail outlets. The development of the mechanically refrigerated retail cabinet opened a market for the fiberboard ice cream container. This "one time shipper" proved a satisfactory container for use in the dry low temperature well of the mechanical refrigerator. It would have been inadequate submerged in the salt solution of the outmoded icebox. This development which created a market for fiber containers is destroying the market for metal ice cream containers.

MUCH of the bacon once sold in the slab is now sold sliced in consumer packages. This change has benefited both food manufacturer and package material manufacturer. Both are indebted to the power driven slicing machine for the benefits received.

Once red fruits and berries paled to an anaemic pink when packed and preserved in the can. Now, thanks to can linings, the result of technological development in synthetic resins, canned red fruits and berries stay red, to swell the volume of can and canned food sales. The introduction of synthetic resin as a can liner opened a new market for beer in cans and a new market for cans as containers for beer.

Bread wrapping was adopted as current practice in many localities before the introduction of the bread slicing machine. But consumer acceptance of machine sliced bread has increased the practice of wrapping bread and has underwritten the stability of the market for wrapped bread. Package material makers and food manufacturers both benefit.

Scattered along the road of technical developments are numerous skeletons of industries which have become mired in the bog of obsolesence. Some have survived only because they have found new uses for their products as new products have undermined their old markets.

The corrugated paper box has undermined the market for barrels and wooden boxes. At the same time, the wooden crate has cut into the market for baskets and hampers. The open-mesh bag has invaded all these and other fields as well. Just now there is a war between glass and paper for domination of the home-delivered milk container field. This is, however, but an outpost skirmish in the great war of the dairy industry against the cost of distribution.

Often the changes which are brought about in the food industry, and also in the package industry, result from developments outside either. Food and drug laws have changed food processing technic and the art of packaging. Sanitary laws have been an influence, too. Store-door delivery has changed the pattern of packaging and changed food processing as well.

As mass distribution developed, so did the consumer package. The development of the chain store and self-service store hastened the trend toward the movement to market of foods in consumer packages rather than in bulk. Both the food and the package had to conform. Conforming required technological improvement.

Even a development as far removed from foods and packages as the automobile has forced changes in both. America with her 25,000,000 pleasure cars is a nation on wheels. The widespread availability of power transportation has diminished the number of meals prepared in the home and increased the number bought outside (Food Industries, February, 1939, page 80). This trend has in the past affected, and will continue to affect, the manufacturer of foods. The trend increases the demand for institutional packages, diminishes the demand for consumer packages.

Good Packaging
Demands Proper Use of Adhesives

Packagers of food products should select adhesives to suit the packaging materials used and the service required, and then apply these adhesives in the best way.

By JAMES P. LANGWILL
Chemist, in charge of packaging research, Reynolds Metals Co., Harrison, N. J.

This article on
PACKAGING
Is of importance to
All Food Manufacturers
Because the proper selection and use of adhesives in the packaging of food products is an increasingly important factor in sales and in obtaining and maintaining consumer good will.—The Editors.

Part I*

DURING the past decade there has been a tremendous growth in both the number and variety of packaged food products. With this has come a demand for more individuality in each food package since it is now recognized that *both* the commodity and the package are for sale. Adhesives are necessary in order to maintain an attractive, properly sealed package and also to realize to the fullest extent the protective features of modern packaging materials. There has never been a time when adhesives have played a more important part than in the production of these modern packages.

Food products are packaged in order to give the consumer a smaller unit of merchandise which is convenient and assures uniformity of product. Because of the size of this unit, the contents seldom deteriorates before it is entirely consumed. Advertising copy and art work are carried by small unit packages to the most advantageous position—the point of sale. A large number of the various packaged food products on the market today owe their very existence and their widespread sale to the protective properties and economy of modern packaging materials. In order that food products may obtain the benefits of these packaging materials, adhesives are a necessary adjunct.

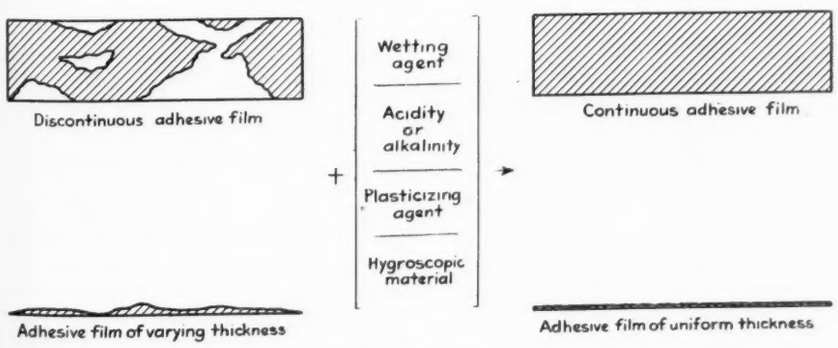
The process of adhesion is almost entirely a matter of surfaces. An adhesive may be considered to be a substance which will wet the surface of the packaging medium and form a solid material adhering tenaciously to it. It serves to create a continuity of the material with which the package is made. There are now available adhesives capable of joining materials of widely varying composition. The problem is to select the most suitable adhesives. It is only with a thorough knowledge of the basic principles involved that this selection can be made intelligently.

In addition to joining various materials, adhesives must also possess many other specific properties. For example, a flour paste—that household necessity in the growing family—would hardly be suitable for sealing a paper bag to be used for potatoes. To be of practical value the paper bag usually requires an adhesive bond which is stronger than the paper itself. The biscuit box must be sealed with an odorless substance which produces a bond of considerable strength. The adhesive for the wrapper of the chewing gum package must join non-absorbent materials, possess no odor and be moistureproof. These few illustrations may serve to indicate that the requisite characteristics of an adhesive are both numerous and exacting.

It goes without saying that all manufacturers attempt to operate on the highest level of efficiency. The food manufacturer must be as watchful of his packaging operations as of his production methods, in order that he may realize the greatest measure of efficiency. Because adhesives are not visible on the finished package, the part played by them in any packaging line probably receives less attention than any other factor when everything is running smoothly. But when the adhesive is not right, the application wrong or the results obtained not satisfactory, then a costly breakdown has already begun. An understanding of the basic principles involved in the use of adhesives would go far in preventing such an occurrence.

The modern manufacturer of food products often maintains a quality con-

* Part II of this article will appear in a forthcoming issue of Food Industries and will discuss the uses of various basic types of adhesives available to the food manufacturer or food packager.—The Editors.



Proper choice of adhesive composition overcomes many difficulties encountered in adhesive application.

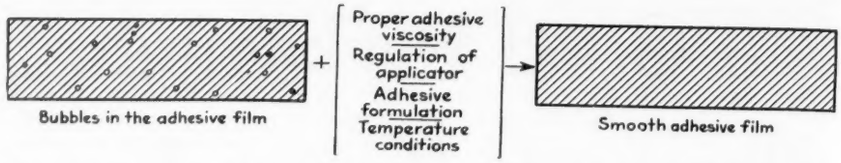
trol department which functions as a liaison between the production and sales departments. It is the men in this department who notice and thoroughly appreciate the apparently nonexistent adhesive problem that is too often taken for granted by many manufacturers. The proper adhesive correctly applied in the production of packaged goods is a tremendously important factor in sales and in the maintenance of consumer good will. It is only through the intelligent cooperation of both food product and adhesive manufacturers that a really fine package can be made with the materials at hand.

Mechanism of Adhesion

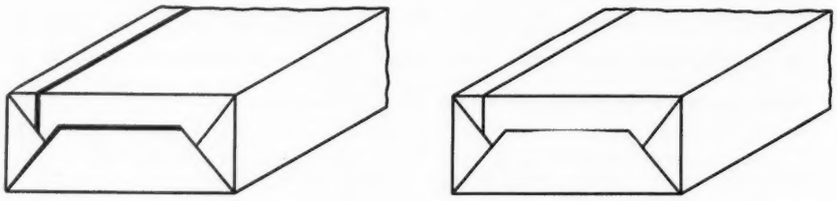
In the consideration of adhesion and its mechanism, it is necessary first to think about the materials in use for packaging. These fall into two general groups: non-porous or non-absorbing; and porous or absorbing. The non-porous group consists of glass, tin plate, metal foils and transparent sheetings of cellulose and rubber-base materials; while the porous group includes cardboard, paper and wood. The joining of any two of these materials is accomplished by two quite different adhesive mechanisms: namely, adsorption and mechanical embedding. When a packaging material of one group is joined to that of another, both mechanisms are operative.

Between two smooth non-porous surfaces, true or specific adhesion occurs. Adsorption is the phenomenon which operates in this instance. This is caused by the affinity or molecular attraction between the adhesive, which is the material adsorbed, and the surface of the packaging material, which is the adsorbing agent. This process of adsorption is largely a physical one, there being no chemical action in the ordinary sense of the word. The degree of this adsorption depends directly upon the size as well as the number of adhesive particles in solution. The conversion of any material to a finely divided colloidal state results in a great increase in its adsorptive properties. For example, when starch is mixed with water, a very large number of extremely small particles may be found in the solution. The stickiness of an adhesive also increases when the total surface area of the particles of the adhesive is increased. This is spoken of as the dispersion of adhesive particles in solution.

The affinity of the adhesive for the surface which adsorbs it may be increased, not only by increasing its degree of dispersion, but also by the addition of an emulsifying or wetting agent such as a soap or sulphonated product. This agent facilitates adhesion and also permits more direct contact between the aqueous adhesive solution and the surface to which it is applied.



Correct adjustment of the conditions under which adhesives are applied often does away with difficulties encountered in adhesive application.



Too much adhesive holds surfaces of wrapping material apart while, in contrast, the correct amount of adhesive holds the surfaces together.

Between two porous surfaces, mechanical adhesion occurs. Adhesion in this case is due to a mechanical embedding of the adhesive in the pores or spaces between fibers. The adhesive becomes firmly anchored to both porous surfaces which are thus joined.

With adhesives which form a joint by adsorption between nonporous surfaces, the strength of the bond depends upon the mechanical properties of the materials joined. In the case of adhesives whose bond is due to mechanical embedding, the strength of the joint between the porous surfaces depends upon the strength of the adhesive film. In a great many instances an adhesive is required to form a joint between a nonporous and a porous packaging material. In that case, adhesion is due to both adsorption and mechanical embedding. Thus, the two primary considerations in the choice of an adhesive are the mechanical strength of the packaging materials and the strength of the adhesive film.

Application

The method of applying an adhesive determines in a large measure its bonding or joint strength. In theory, at least, the strength of the joint when stress is applied in a direction at right angles to it should be as great as that of the material itself. Two methods of obtaining greater mechanical joint strength are: (1) by allowing the adhesive coat on the two surfaces to thicken or partially dry before making the joint; (2) by using a diluted solution of the adhesive as a primer or first coat on the materials. After this has been allowed to dry, a second coat of adhesive is employed for the joint.

By careful application of adhesives, three of the principal causes of joint failure can be controlled. These three causes are: (1) discontinuous films; (2) films of varying thickness; (3) bubbles in the film. The first two problems arise from the lack of affinity of aqueous adhesives for smooth nonporous surfaces. The adhesive film may be made more continuous by the addition to the adhesive solution of one of the wetting agents previously mentioned. These wetting agents lower the surface tension of the liquid and consequently facilitate its impregnation of the surface to which it is applied. Another method which may be employed is the use of material containing free acid or alkali. This is of especial value in the case of metal foils. The roughened surface which results affords adequate anchorage for the adhesive solution. The etching usually is far too slight to have any undesired effect upon the strength of the material to be joined. A third modification of the adhesive can be made by adding materials capable of imparting to the aqueous solution a certain plastic or hygroscopic character. Examples of such materials are glycerine, glucose, emulsifying oils and licorice extract or glycyrrhizine. In the case of nonaqueous adhesives (that is, those which are solutions in organic solvents), the working properties can be enhanced by the addition of oils or heavy solvents possessing plasticizing properties. It must be borne in mind, however, that when hygroscopic or plasticizing agents are used there results a reduction in rapidity of drying and in the hardness of the adhesive film.

The problem of bubbles in the adhesive film may occur because of various conditions. Bubbles may be produced in the application of the adhesive or may be present in the adhesive as foam or air occlusions. An adhesive which is too thick may form a film containing bubbles whether applied by brush, gumming machine or entirely automatic equipment. This occluded air may be dissipated after some passage of time, but rarely disappear within the time allotted to the sealing process.

Agitation caused by the adhesive transfer device often results in foaming. Usually this condition becomes chronic when the mechanical applicator is driven too fast. The temperature, viscosity and perhaps even the formulation of the adhesive may require adjustment; and more often, the proper time is not being allowed for the sealing operation. There is a certain optimum speed associated with each type of mechanical applicator which takes into account the characteristics of the adhesive used, the materials to be joined and the mechanism of the sealing operation. This is not often an arbitrary rate but one which is arrived at after considerable experimentation.

Another principal cause of failure in joints is insufficient drying. This factor can be controlled by the proper allocation of time even with forced drying. When too much adhesive solution is used, the surfaces are held apart instead of being bound together. The more adhesive used for a joint, the longer the period required for it to set and become dry. The temperature and relative humidity of the packaging room must be properly adjusted if sufficient drying is to be obtained. It is well to remember that the smallest amount of adhesive which produces a continuous film of uniform thickness will result in the greatest efficiency.

All users of adhesives will agree in their demand that the packaging process be rapid as well as economical. The requirement for cheap and rapid setting adhesives must ultimately result in a compromise since the rapid setting type is usually more expensive. Cheap adhesives may contain water from ten to twelve times the weight of the dry solids and may need further dilution before application. The viscosity of an adhesive in no way indicates the exact amount of dry constituents present, for it is possible to use base materials which have a high swelling power. The viscosity of the original adhesive solution may be increased by chemical action or by the addition of cheap materials which thicken in solution. Rapid setting may be accomplished by using a highly concentrated adhesive solution, one containing a large percentage of dry constituents. In the more expensive concentrated adhesives, the ratio of water to dry material may vary from 0.5 to 1 up to 1.5 to 1, depending largely upon the reaction of the base materials in aqueous solution. Another method might be the use of solutions of adhesive bases in highly volatile organic solvents instead of water.

Moisture Resistant Joints

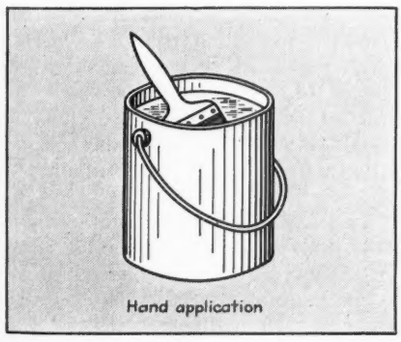
A moisture resistant adhesive joint offers great stability under continued exposure to humid conditions. Here are four methods of forming moisture resistant joints:

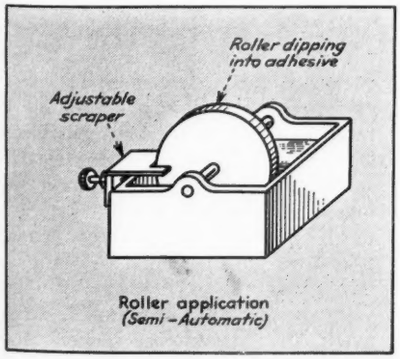
1. An aqueous adhesive may be used which upon application subsequently becomes insoluble. The action of formaldehyde on a gelatin or glue adhesive produces an insoluble material, and when a casein adhesive is treated with lime, the reaction product, lime caseinate, is insoluble. The disadvantage of this type of adhesive is that it deteriorates in a comparatively short time.

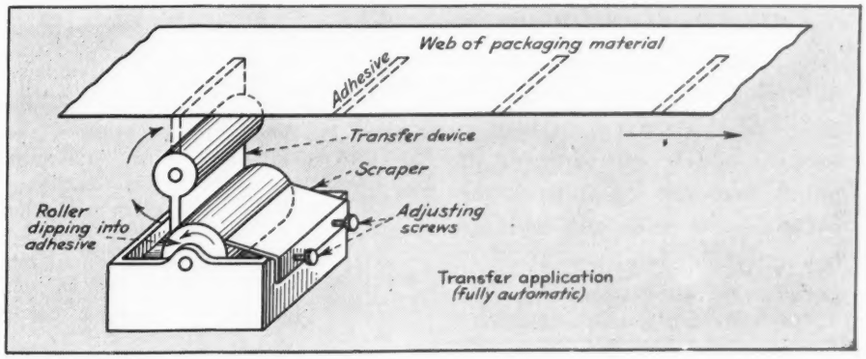
2. The use of an adhesive base which is soluble in a volatile organic solvent but not in water. The rubber and cellulose base adhesives are examples.

3. The third may be designated as the two-solution method. Two substances capable of reacting with one another are deposited, one on each of the surfaces to be joined, and the surfaces brought together. In the case of rubber solutions, one would contain sulphur and the other a vulcanization accelerator. Or, a synthetic resin (urea-formaldehyde condensation product) and a substance having a hardening or curing action thereon might be brought together. Another example is a gelatin or glue adhesive and a solution containing the compound hexamethylenetetramine. Heat is required to liberate the formaldehyde from this compound which possesses an insolubilizing action toward the gelatin.

4. Finally, the same adhesive may be applied to both surfaces and then dried. When heat is applied, instantaneous adhesion results. The adhesives used in this method possess thermoplastic properties and may consist of waxes, cellulose esters, shellac or vinyl resins. Thermoplastic materials such as these may be formed and reformed many times into definite shapes by the application of heat and pressure, provided sufficient plasticizing agent is present to impart the proper flow. No chemical action takes place during heating; hence the material remains in the plastic state as long as the sealing temperature is maintained. This dry method has the added advantage of requiring no water when the joint is formed.







Adhesives may be satisfactorily applied in many ways, from hand application by brush to the most complicated of mechanical devices. Here are three simple application methods.

The Product Comes First In Successful Packaging

It should be the primary consideration in the design of the container

By CLIFFORD B. PAPE
Merchandising Consultant, Montague, Mich.

IS it possible that in our desire to keep abreast of the times in food product merchandising we may be placing too much emphasis on packaging and overlooking the importance of the basic product itself? Are manufacturers to become wholesalers of packaging materials, rather than distributors of their own products?

Merchandising will never become an exact science. What is or is not good merchandising will always be a matter of opinion—analysis of happenings based on experience adjusted to trends. There are, however, certain fundamentals which appear to survive in spite of exceptions and in spite of the so-called changing times.

In the present complicated age of distribution, and the intensive competition which exists, each factor contributing to any part of the process must be considered only in its relation to the whole, without undue emphasis on any one part. Product and package must be considered in proper relation to each other. Sometimes in the stress of present-day merchandising the product appears to be almost forgotten.

The production man in the plant tears his hair at the constant pressure applied to him to cut costs so that the package can be "dressed up" and the unit still kept within a proper retail price range. It is an old rule that the cost of the package should be in proportion to the cost of the product. There have been exceptions in the past, to the profit of manufacturers, and undoubtedly there will be some exceptions in the future. But in the majority of cases, continued consumer acceptance depends on intrinsic values, regardless of the outside appearance of the package. The product itself eventually will have to stand on its own feet, and it will have difficulty competing if its value is out of proportion to its packaging cost.

No one familiar with modern retail outlets and consumer habits would advocate a return to "bulk" merchandising. Individual packages mean brand identification and guarantee of quality, plus sanitation and convenience to the consumer. The need of adequate individual packaging is perhaps greater today than it ever has been. Improvements in processes and materials have made it necessary for each manufacturer to keep his product and package in line with competition, but this usually can be done without going to extremes, regardless of general trend. The product, however, must be the first consideration, and the package must be built to meet the need of the product. Uniformity of quality does not end in the manufacturer's plant. It must be carried through to the ultimate consumer by means of efficient use of the materials available for safeguarding quality.

There are many factors which enter into successful merchandising, and packaging is only one of them. An attractive, unusual package will move a product over a retail counter once, but repeat sales depend on intrinsic value. If, in order to secure initial sales, a product is burdened with package material costs over and above what might be considered necessary for the maintenance of quality and good package appearance, the unit will be called upon to sustain this added burden continuously. Once the character of a package is established, it is difficult to change the container. This added burden differs from advertising and sales promotion in that the latter two expenses can be controlled and varied according to conditions.

If an item has no fixed retail price, the added cost of packaging for sales purposes usually is reflected in the final sales price to the consumer, and at a considerable increase over the original cost of the additional materials because of the various profits added at each stage of distribution. In some instances, on an item selling for more than 20 cents, an additional 1 cent cost for packaging materials might mean an additional 4 cent cost to the consumer.

The advent of the self-service store developed the necessity of outstanding packages. New and attractive wrapping materials secured special displays for manufacturers and helped sales, but as other manufacturers adopted these materials, their uniqueness was lost. Manufacturers found themselves burdened with high packaging costs, out of proportion to the product packaged. Even containers with re-use value are apt to fall into this class. With few exceptions, the consumer eventually becomes burdened with surplus re-use containers and develops a consciousness of paying a premium for the container.

PACKAGING for consumer convenience should also be considered cautiously if the cost is materially higher. The consumer usually likes to secure convenience without being conscious of any extra cost. And while all surveys would indicate that the consumer is desirous of having extra convenience in opening and closing packages, this desire does not always evidence itself to any degree in the retail store when the consumer is considering the value of one product against another. Furthermore, anyone who has made a point of watching consumers open "convenient" packages will agree that, with few exceptions, the extra expense of convenience is hardly warranted. In any event, the convenience device should

Case Histories Coming

This is the first of several articles discussing some controversial viewpoints on packages. In later issues the author will illustrate the points made in this introduction by means of examples and case histories from food packaging experience.—The Editors.

Mass displaying of food packages in self-service stores has encouraged a wave of package changes, the expense of some of which has not been justified by the results.

not add to the cost materially, and it should be foolproof. It is hard to find a combination that will answer both requirements.

The greatest emphasis should be laid on uniformity in the quality of the product, for upon this quality the consumer places final valuation, exterior appearance and convenience notwithstanding. The histories of successful manufacturers show that they have consistently given the public products of uniformly good average quality, at a fair price.

Many of us are inclined to be swayed by the temporary success of some competitor in adjusting our own merchandising perspective, but we cannot get away from the fundamentals of merchandising. And in the final analysis, success revolves around the product, not the package. Where package and product are in harmony, quality for quality, we have achieved a real combination, but the package should be built to fit the item we sell.

The public is very fickle in its behavior. The fact that it has accepted certain evident facts for a period of time does not mean that it will continue to do so. And if, for no matter what reason, the ratio of cost of package to cost of product becomes increasingly out of proportion, sooner or later a top-heavy situation will be created which will become apparent to the consumer.

It would be well for the manufacturer to carefully analyze his entire packaging program, separating the serviceable features of his package from those which are being utilized for sales promotion and combining the two wherever possible by use of materials which can serve both purposes. Where further merchandising is needed, its cost should be set up as advertising and sales promotion.

No packaging material is too costly that performs a definite service to the consumer in the retention of the quality of the product. But when the manufacturer asks the consumer to pay a premium merely to have his or her attention drawn to the package, that manufacturer is placing himself in a vulnerable position in respect to his more astute competitors. Even a reduction in the unit size of packages should be considered very carefully, if by such a reduction the ratio of package cost to product cost is increased too greatly.

THE art of packaging has advanced tremendously in the last ten years. Ideas of quality have changed. Competition forces each manufacturer to produce the best product possible, utilizing all the newer arts and sciences, and also demands that he protect this added quality until his product is in the consumer's hands. Education through advertising has made the consumer more quality conscious. And by the word "quality" is meant "the maintenance of the characteristics which the consumer has come to recognize or accept in relation to that particular product, whenever and wherever purchased." To fit such a qualification, a product should have adequate protection if it is subject to any organic change. Here again it is not necessary to go to extremes.

It often happens that standards of quality which the manufacturer sets up may differ from those of the consumer, who may place emphasis on points not considered of serious consequence by the producer.

All food packages should be efficiently sealed. Either the wrapper or the liner, or both, should be sealed regardless of whether the material used for sealing is paper or a more efficient moistureproof material. One of the fundamental objects of packaging is sanitation, and one of the first assurances of sanitation is efficient sealing. In this regard, considerable improvement could be made in the majority of packages now on the market.

There are a great many instances where higher priced and more efficient wrapping materials would be warranted in packaging if they could be efficiently sealed mechanically, because they would contribute to maintenance of quality. Most of these higher cost materials also have great sales appeal, and where the factors of sales appeal and efficient maintenance of quality can be combined, changes can be effected in a product in a great many instances which would enable it to command a higher price, and thereby warrant the higher cost.

The focus, however, should always be placed upon the product, and maintenance of its quality considered first —all other factors should be plus factors.

Good merchandising requires the faculty of examining a product from the viewpoint of the consumer. It requires a study of the underlying causes which motivate the consumer in his desire for and use of the product. Good merchandising emphasizes the points which appear to have greatest appeal, and if necessary, adjusts the product to fit these appeals. It also calls attention to the product by providing a package of different appearance. Package difference may be accomplished by a package of extreme simplicity, as contrasted with other packages carrying many confusing messages with emphasis on none.

Germicidal Properties Of Hot Paraffin*

By

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and

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Part I

BECAUSE of the widespread use of waxed papers and containers for the storage and distribution of foodstuffs and the increasing use of waxed containers for this purpose, it seems desirable to assemble the different information available in the literature and in unpublished records which deals with the bactericidal effect of the paraffination process, both on the coated paper or board and on the paraffin surface of the finished container. The following paper reviews this work and contributes further information with regard to the problems which would appear to be of interest in view of the sanitary problems involved in the distribution of foods in containers of this type.

Historical Review

Work on this problem started as early as 1898 when hot paraffin or paraffin oil was advocated as a medium of sterilization. Forgue and Reclus (1898), for instance, believed that oil over 100 deg. C. (212 deg. F.) was a good sterlizing agent. However, Anderson (1907) and Kieffer (1907) reported that the temperatures had to be much higher to insure sterility, an observation confirmed two years later by Conradi (1909). Anderson (1907) investigated two temperatures, 120 deg. C. (248 deg. F.) and 150 deg. C. (302 deg. F.), using spores of *Bacillus subtilis* as the test organism. Exposure of the spores of this organism in hot paraffin at the above temperatures for ten minutes was insufficient. They were killed only after 30 minutes at 150 deg. C. (302 deg. F.). Kieffer's experiments (1907) were more extensive. The test organisms were 2- to 8-day growths of spores of *Bacillus anthracis*, a 24-hour growth of staphylococcus, and an 8-day growth of *Bacillus vulgatus*. The test organisms were carried on a small brass wire which was held in the oil for the time indicated. After removal, they were placed in sterile broth to allow the viable bacteria to develop. Exposure to hot paraffin for ten minutes at 150 deg. C. did not destroy all of the organisms. Conradi (1909), realizing the ineffectiveness of anhydrous liquids, used much higher temperatures. At 200 deg. C. (392 deg. F.), spore formers were killed in one minute. Amako's results (1909) were quite similar when using *Serratia marcescens, Echerichia coli, Bacillus anthracis* and *Salmonella schottmülleri*. Results of Dreyer and Walker (1912) and Bartlett and Kinne (1914) are in agreement with those just reported.

The most extensive investigation into the problem of thermal death times of bacteria in non-aqueous mediums was carried out by Bullock (1914). Unfortunately, he did not use paraffin; the nearest approach to it might be glycerine, with which he secured results not unlike those reported above for paraffin. Davis and Rosen (1917), using *Staphylococcus aureus* as a test organism, found that high temperatures were required to destroy the organism in hot paraffin. Layman's results (1917) from an investigation of hot-oil sterilization of surgical instruments were more encouraging. Results with *Staphylococcus aureus* and *albus* were so encouraging that he recommended that syringes be sterilized in oil at 150 deg. C. (302 deg. F.); no data were given to support the recommendation. The sterilizing effects of hot paraffin were also studied by Dirska (1922). He used spores of *Mesentericus fuscus*, an aerobic spore former which is widely distributed in nature. The organisms were suspended on threads which were placed in the hot paraffin. Liquid paraffin at 130 deg. C. (248 deg. F.) did not kill the organisms in 40 minutes. Thirty minutes' heating, however, at 150 deg. C. (302 deg. F.) destroyed the organisms. At 180 deg. C. (356 deg. F.) the organisms were able to survive only ten minutes' heating. Believing that the widespread use of hot liquid paraffin for sterilization of surgical instruments was ill founded, Rodenbeck carried out an extensive investigation, the results of which were reported in detail. The test organism was an aerobic spore former isolated from garden earth. This organism was heated in various anhydrous menstrua such as cumol, glycerol, fat, oil and paraffin. Starting with 150 deg. C. (302 deg. F.) with a death time of some six hours, the rates progressively shortened as the temperature was raised. At 200 deg. C. (392 deg. F.) there was almost complete destruction of the living cells. The death rate was quite uniform to 170 deg. C. (338 deg. F.) where the organisms were destroyed in 40 minutes.

That many of these experiments were uncontrolled should not be overlooked. Practically no attention was given to heat resistance of the organisms used or to the numbers of organisms used. Little information is available with respect to rate of death. It is obvious from more recent work

This is an article on
PACKAGING

It is of interest to
All Food Manufacturers

Because it discusses the sanitary qualities of paraffined paper containers which some manufacturers use and others compete with.—The Editors.

* Presented before the American Oil Chemists Society, Chicago, October 4–6, 1939.

that hot paraffin wax does exert an appreciable destructive effect on bacteria.

Prucha's work (1938) may be reviewed at greater length because it bears directly on the subject of this paper. While his work was prompted largely by interest in the paper milk container, his results are probably of broader significance. In laboratory experiments Prucha used small strips of paper ½ by 2½ in. After the strips were inoculated, they were paraffined at different temperatures. They were then dropped into a culture tube containing 15 per cent milk and 85 per cent water as a culture fluid. Appearance of a red color was taken as evidence of viability and growth of the test organism, *Serratia marcescens (Bacillus prodigiosus)*. Results secured with such technic are, of course, qualitative, *i.e.*, nothing is revealed as to the extent and rate of death, and should be interpreted with this fact in mind. At 71 deg. C. (160 deg. F.) viable cells survived for 60 seconds; at 77 deg. C. (170 deg. F.), for 30 seconds; at 82 deg. C. (180 deg. F.), only one tube out of six showed the presence of viable cells after exposure of 20 seconds, indicating that this temperature was quite lethal. The strips paraffined at 88 deg. C. (190 deg. F.), 93 deg. C (200 deg. F.) and 100 deg. C. (212 deg. F.) also showed one tube with growth after 20 seconds' exposure. Prucha also determined the facts for hot water by using the same technic. Hot water, as was known, is more germicidal. All cells were killed after ten seconds when exposed on strips of paper at 66 deg. C. (150 deg. F.); in 45 seconds at 63 deg. C. (145 deg. F.); but not after 60 seconds at 54 deg. C. (130 deg. F.) and 60 deg. C. (140 deg. F.).

Sanborn (1939) stated that efficient paraffining of high quality paperboard suppresses or "seals in" the few bacteria which are in paperboard. He stressed the value of adequate coverage of board with paraffin. His tests indicate that as satisfactory coatings of wax can be obtained at 74 to 77 deg. C. (165 to 170 deg. F.) as at temperatures of 82 to 85 deg. C. (180 to 185 deg. F.). Ninety-six per cent of 730 milk containers paraffined at 165 deg. F. yielded less than 5 colonies per container, while only 95 per cent of 1,370 containers paraffined at 180 deg. F. yielded less than 5 colonies per container. Whether this difference is significant is open to question, but the results indicate that above a temperature of 74 deg. C. (165 deg. F.) the bacteriological results are not materially different.

Prucha also paraffined paper milk bottles which had been heavily inoculated with the test bacterium *Serratia marcescens*. The containers were dipped into a suspension of this organism having 200,000,000 cells per cubic centimeter. Such a method of inoculation would give many more bacteria in a container than would ever be found in practice. As soon as the containers were dry, they were paraffined and examined by adding 30 cc. of nutrient agar, shaking and incubating. Many hundreds of containers were paraffined at temperature intervals of 5 deg. C. (9 deg. F.) between 71 deg. C. (160 deg. F.) and 88 deg. C. (190 deg. F.). While most of the containers were free from living cells, a few showed living cells at all temperatures of paraffining. It should be emphasized that a very heavy inoculation and a very rigorous method of testing for viable cells were used.

F. W. TANNER

H. F. LEWIS

To show the effect of strength of inoculation, another of Prucha's experiments may be quoted. When he used a suspension containing only 2,000,000 bacteria per cubic centimeter and paraffined the bottles at 77 deg. C. (170 deg. F.), 82 deg. C. (180 deg. F.) and 88 deg. C. (190 deg. F.), not one bottle showed the presence of viable cells. A suspension of 2,000,000 cells would infect a container with many more bacteria than would ever be found on a paper milk bottle. Prucha realized this fact, for he gave up this method of inoculation, finally resorting to inoculation of the container by dipping his hand into a suspension and then rubbing the inside of the container.

In the light of the foregoing experiments, the temperatures used in the application of paraffin to food containers, namely, from 175 to 185 deg. F., would appear to provide adequate sterilization of these containers. Additional experiments, as described later, have been conducted which still further support that view.

*Paraffin Characteristics**

Paraffin wax, which may be obtained either as crude scale or as fully refined paraffin, has many characteristics which make it a suitable covering for food containers. These have been mentioned by Tanner (1938).

1. *Paraffin contributes to rigidity and strength.* The presence of paraffin on paper contributes greatly to the stiffness and shape of a container made from it. The higher the melting point of the wax, the greater the rigidity of the container. These characteristics are related, not only to the melting point of the wax, but also to the amount which is put on the paper. This is controlled, in part at least, by the temperature of paraffination; higher temperatures of paraffination permit greater "run-off" with less paraffin remaining on the paperboard. It is desirable that some middle ground be established with respect to the temperature of paraffination so as to achieve a satisfactory sterilization and at the same time allow the container

* The following are a number of specific references in which are discussed in detail the physical characteristics of paraffin: U. S. Bureau of Mines *Bull.* 368, 1925, "Paraffin Wax and its Properties"; Bureau of Mines *Bull.* 388, 1935, "Manufacture of Paraffin Wax from Petroleum"; *Journal of the Institute of Petroleum Technology*, **12**, 1926, J. A. Carpenter, "The Physical and Chemical Properties of Paraffin Wax"; "Composition and Crystal Form of Petroleum Waxes", Ferris, Cowles and Henderson, *Industrial and Engineering Chemistry*, **23**, 6, 1931; "Petroleum Waxes. Their Properties and Uses", F. W. Paget, *Oil and Gas Journal*, Feb. 3, 1938.

to undergo satisfactory waxing, both for rigidity and moisture protection.

2. *Paraffin improves appearance and gives a brilliant finish.* Waxed paper and paperboard have an appearance and finish not possessed by unwaxed paper. Paraffin wax brings out the colors and gives the entire package an appeal which is not possessed by unwaxed packages.

3. *Paraffin makes a hermetic seal possible.* Food packages may be sealed when paraffined or wrapped in paraffined paper.

4. *Fully refined paraffin is free from odor, color and taste.* Fully refined paraffin wax is chemically inert. It is odorless, colorless and tasteless itself but may pick up odors unless it is properly stored.

Below 190 deg. F. the various grades of paraffin are stable toward both alkalies and acids. Chlorine combines slowly at room temperatures —more rapidly at higher temperatures. At ordinary temperatures paraffin is relatively stable toward oxidation, whereas at higher temperatures oxidation may occur to yield products which may be detected in the wax by their characteristic odor. Below the waxing temperature, the rate of oxidation is slow; above the waxing temperature, the rate increases. Paraffined containers coated with oxidized wax may possess an undesirable odor and impart a taste to the contents. Proper "housekeeping" and temperature control will keep this at a minimum; in this connection, *consideration should be given to the elimination of copper from the materials used in constructing a paraffining plant, for copper has a marked catalytic effect on the paraffin oxidation.* Various forms of dirt and impurities in the paraffin may have the same catalytic effect.

5. *Paraffin is almost inert to bacterial attack.* Paraffin wax is very resistant to attack by microorganisms. Those which are able to decompose it are uncommon soil types which would not be found ordinarily in foods or in the paper mill. Furthermore, they act very slowly and could not be of any significance in the food industry.

6. *Paraffin is free from microorganisms.* Paraffin is such an inert substance that it will not in itself support bacterial growth. It is subjected to the action of such heat both during preparation and while being applied to the paper that microorganisms would be killed. It is usually molded into large cakes in the refinery by being run while hot into molds. These cakes are then wrapped in muslin lined burlap bags or packed in sealed cardboard cartons when intended for use in the food industry. This keeps the paraffin clean. In one case known to the authors, the paraffin is transported from refinery to the factory, where it is applied to the paper, in insulated tank trucks; it is stored in heated tanks until used. Such a practice permits use of a paraffin which is clean and free from foreign matter. In addition to this, fully refined paraffin is treated with sulphuric acid which assists in destroying microorganisms.

Many attempts have been made to find living bacteria in paraffin. They have resulted uniformly in negative results. While these results may be partially attributed to lack of a satisfactory technic, it is inconceivable that bacteria could live in solid paraffin wax.

7. *Paraffin is available with various melting points.* Waterproofing agents are used in the food packaging industry under many conditions and on various materials. Consequently they must be applied in different ways. Paraffin is available with different melting points, making it possible to vary its application with the season and other factors. Addition of higher melting point waxes is also possible.

8. *Paraffin is a waterproofing material.* The moisture-proofing properties of paraffin are well known. When added to paper, it gives a product which prevents the passage of water in a relatively satisfactory manner.

9. *Paraffin is an important agent in producing a sterile food container.* Paraffination under conditions which can obtain in making paper milk containers involves two separate actions on bacteria. First, it covers and imprisons the bacteria if any are present on and in the paper. Second, when paraffining is done at 73.9 deg. C. (165 deg. F.) to 82.2 deg. C. (180 deg. F.), which is probably the best temperature range for paraffining, it does destroy a very high percentage of the miscellaneous kinds of bacteria, corresponding to the process of pasteurization and sterilization as defined in the dairy industry. Paraffination as now accomplished almost completely eliminates all kinds of bacteria. This has been shown by the examination of many thousands of paraffined containers in several laboratories, such as those of the New York Department of Health; the New York State Agricultural Experiment Station, Geneva; the Department of Bacteriology, University of Illinois; and the American Can Co. at Maywood, Ill., and Jersey City, N. J. Roughly stated, over 90 per cent of the containers are sterile. The severest tests reveal no bacteria in them. The few bacteria that are found in the few containers are almost entirely spore bearing bacteria which cannot be killed by the accepted bactericidal treatment recognized as satisfactory in sanitary controls.

Paraffin is not as effective as water at the same temperature, but it has bactericidal action if the temperature is high enough. In Prucha's experiments, strips of paperboard were dipped into a suspension of *Bacillus prodigiosus* of 200,000,000 cells per cubic centimeter. Each strip absorbed 0.1 cc., thus being inoculated with 20,000,000 cells. These heavily inoculated strips of paperboard were freed of all the organisms in

20 sec. at 100 deg. C. (212 deg. F.)
30 sec. at 93.3 deg. C. (200 deg. F.)
30 sec. at 87.8 deg. C. (190 deg. F.)
45 sec. at 82.2 deg. C. (180 deg. F.)
45 sec. at 87.8 deg. C. (190 deg. F.)

In another experiment 1,200 containers were handled in the milk plant before paraffining by an operator whose hands were heavily infected with *Bacillus prodigiosus.* The bacterial suspension had about 150,000,000 cells per cubic centimeter. Four hundred containers were paraffined at each of three temperatures, namely, at 76.7 deg. C. (170 deg. F.), 82.2 deg. C. (180 deg. F.) and 87.8 deg C. (190 deg. F.). Only one container showed the presence of the inoculating organisms. In another experiment, the containers before paraffining were inoculated by dipping one's hands in a bacteria suspension and rubbing with it the inside of the unparaffined containers. In the experiment 100 containers were paraffined at 71.1 deg. C. (160 deg. F.), 100 at 76.7 deg. C. (170 deg. F.) and 100 at 82.2 deg. C. (180 deg. F.). The bacteria suspension had 50,000,000,000 per cubic centimeter. At 71.1 deg. C. (160 deg. F.), 91 containers were free from the bacteria and in 9 containers they survived. At 76.7 deg. C. (170 deg. F.), 99 containers were free from the bacteria and one was positive. At 82.2 deg. C (180 deg. F.) all 100 containers were free from the inoculating bacteria.

Part II of this article will be published in the April issue of FOOD INDUSTRIES.—*The Editors.*

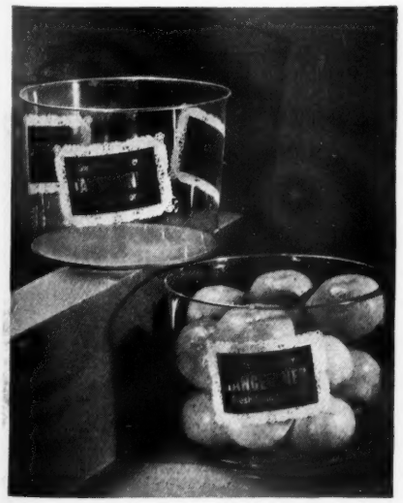
Hints and Hurdles

Payment Plan for Foods

A FOOD COMPANY was among the pioneers in direct-by-mail selling. Frank E. Davis Co., Gloucester, Mass., was among the first plough a furrow through the virgin field of selling by mail, offering cured fish to inlanders far from the seacoast.

Bread is another food product which has obtained a profitable distribution by mail. Uncle Sam carries many loaves of bread each day to different parts of the country, among them a fair portion of the output of Pepperidge Farm Bakery (FOOD INDUSTRIES, Nov. '38, p. 630). In the case of the latter product, however, only the delivery, not the selling, is done by mail.

That innovation in merchandising, the "partial payment" or "deferred payment" plan which has moved millions of tons of luxuries as well as necessities in the last 20 years, has had scant application, if any, in the food industries. Though the annual expenditure for food may require 30 per cent to 40 per cent of the annual budget of most families, the unit purchase is small, and the items extremely perishable. The partial payment plan has been most successfully applied to nonperishable or durable goods involving a relatively large purchase price, such as automobiles, furniture and jewelry. Now, however a food product is advertised and distributed on the partial payment plan.



Florida Citrus Commission this year used a unique package for stimulating the sale of tangerines. Of heavy transparent cellulose, the package was unique not only in appearance and design but because it remained in the retail outlets.

ORDER
Maier's Grand
FRUIT CAKE
& SALAD SET
Gift Combination
NOW...
Only $3.49 and pay it this new easy way... in
Maier's FRUIT CAKE Budget Club
49c down...50c a week for 6 weeks
$3.49 Gift Combination Includes
Or Buy the $2.50 Fruit Cake Alone
...Five 50c Weekly Payments
ORDER IT FROM YOUR GROCER OR MAIER'S ROUTE MAN
Maier's BAKERY

Maier's Bakery, Allentown, Pa., advertises fruit cake on partial payment plan.

Maier's Bakery, Allentown, Pa., advertises a 3-lb. fruit cake, chromium-trimmed salad bowl and wooden salad fork and spoon combination gift package for 49 cents down, balance in "easy payments" of 50 cents per week for six weeks, a total of $3.49. Approximately 400 purchasers responded during the two weeks following the first advertisement.

Maier's Bakery's deferred payment plan differs from most partial payment plans in that the merchandise is not delivered until paid for. The Maier's Bakery route salesmen sign up customers, receive the 49 cents down payment, and weekly payments of 50 cents until purchase price has been received. Then the gift package is delivered.

Many housewives who do not have $3.50 in cash for a fruit cake can squeeze out the amount of the weekly payments. Under this plan the merchandise is not consumed or destroyed before the purchase price is paid. No bad debt losses occur, no carrying charge is required.

The cash in advance partial payment plan may have applications to other food items or to bulk quantities.

Big Battle, Little Skirmish

WHERE there is smoke there must be fire—where there are broken swords, battered armor and spilled blood, there must be a battle. Claims and counterclaims (FOOD INDUSTRIES, January, 1940, page 66) furnished evidence of a battle between glass and paper milk container manufacturers.

In New York, delivered milk in 2 qt. paper milk containers is offered at 1½ cents per quart below the price per quart in glass bottles. In St. Louis and Chicago, milk in 2 and 4 qt. glass containers is offered, delivered at the doorstep, below the regular quart price. And now, in a suburb of New York, the price of a quart of milk in a 1 qt. glass bottle has dropped 3 cents on all quarts bought at the same time except the first.

Yes, a battle is being waged—the evidence is positive. But as far as the dairy industry is concerned, the skirmish between the container manufacturers is insignificant. The big battle is an old, old one—the battle to deliver a bigger payload at the same cost—a battle to reduce the cost of distribution.

Bread from Germ Flour

SOUTH SIDE BAKING Co., Indianapolis, Ind., is marketing a white bread loaf made with wheat-germ flour supplied by Baur Flour Mills Co., St. Louis, Mo.

In the making of this wheat-germ flour the germ is separated as in the standard method of milling and freed from a high percentage of its oil content by solvent extraction. The defatted germ and middlings are then blended and milled together to give a final product containing the same percentage of germ solids as was in the original wheat.

Germ-containing flour made in this manner can be stored for long periods without becoming rancid or losing the vitamin B and G content supplied by the de-fatted germ.

New Packages & Products

Frontier for Foods

America is growing up. Yesterday's frontiers are now metropolitan. No new wilderness left to conquer and exploit. Though this is largely true for America's territorial wilderness, fortunately it does not hold true for pioneering in manufacturing—in food manufacturing. Though it is by no means simple to "muscle in" and survive in today's highly competitive food market, there is nevertheless much unexplored virgin territory ahead for profitable exploration. This is in the realm of new processes, new products, new mixtures, new flavors. The unexplored is limitless.

"Niblets Mexicorn", a product of Minnesota Valley Canning Co., Le Sueur, Minn., is a new product which mixes green and red peppers with whole kernel corn cut from the cob, providing a new prepared dish with a new flavor.

Cereal from Native Dates

One of the latest additions to the ever increasing number of food products high in vitamins, rich in minerals and low in calories is "Date Flakes," manufactured by Covert Fruit Products Co., Beaumont, Calif. Originally developed as a health food product for hospitals and sanitariums, these dried flakes of dates made from Del Noor dates grown in Coachella Valley, Calif., and combined with particles of whole wheat, are now being distributed in Pacific Coast retail stores.

The product is packaged in 8 oz. transparent cellulose bags closed with metal tabs. The fasteners at the top of the bag attach label and a recipe booklet to package. The recipe booklet suggests the use of Date Flakes as a breakfast cereal and as the basis of puddings, cakes, bread, pie filling.

Package Suitable for Contents

Worcestershire sauce, like most condiments, is not consumed immediately after purchase, but remains for long periods in the kitchen and often on the table. Evangeline Pepper & Food Products, St. Martinsville, La., takes this fact into consideration in the recent selection of a container for "Evangeline" brand worcestershire sauce. This recently adopted container has three features especially suitable for the contents. The new bottle is of dark amber glass which will not show stain from drippings. The label is the result of ceramic paints applied to the bottle and baked into the glass. The label can be washed. Neither bottle nor label need ever show evidence of the spilled contents. The pouring lip of the bottle is narrowed down so that measured quantities of the contents can be delivered. The bottle is closed by a small screw-on plastic cap.

Sturdy Three Piece Container

New 5-lb. institutional size and 2-lb. consumer size containers for packaging processed cheese have recently been adopted by Shefford Cheese Co., Green Bay, Wis. These new containers not only provide adequate protection to the product but facilitate packaging operations. The package itself consists of a three-piece folding carton consisting of a cover, bottom and sleeve, and a liner of transparent polymerized rubber.

The cover and bottom trays are of

equal depth, meeting at the middle of the sleeve when the box is assembled. The introduction of a sleeve of heavy fiberboard solved several problems in packaging the processed cheese. The heavy walled package serves as a mold into which the hot cheese is poured. The package must be sufficiently strong to form the hot melted cheese into a perfectly shaped brick and durable enough to withstand handling by automatic machinery. The new container answers these requirements.

When the package lid is removed for displaying contents, it is important to present the side away from the liner folds. This is accomplished by setting up the sleeve in the carton lid, inserting the liner with the manufacturer's label face down, and covering the brick with the carton bottom when the cheese is poured and sealed. When opened, the manufacturer's label is on top of the loaf.

Access to the new container is easy. It is not necessary to use tools or to pry up the lid. Opening the package requires only lifting half of a telescope lid.

Package with Atmosphere

The recently adopted key opened, lithographed, vacuum tin container for "Elmer's" Louisiana pecan candies, product of Elmer Candy Co., New Orleans, La., not only extends the life and freshness of the nut candies, but provides a means of adding local color and atmosphere. The sides of the container carry a lithographed reproduction of the New Orleans French Quarter. On the top is a color reproduction of a scene in one of the French Quarter courtyards. Promotion for Elmer's pecan candies suggests that they are made according to recipes of confectionery delicacies made by slaves of Creole families 200 years ago.

Compartment for Recipes

Recipes on many occasions have proved to be a potent sales stimulant. The use of this sales tool, however, often involves difficulty. If recipes are printed on the label, the number which can be included is limited. Variation is possible only by changing the label. When recipe folders or booklets are packed in the shipping case they are at the mercy of the retailer—at best a precarious situation. If recipe booklets are attached to the outside of food packages they run the hazard of detachment or mutilation. The character of many food products prevents including recipe booklets in the package.

Wilson & Co.'s new lard container solves the recipe booklet problem. The only places for recipes on the former 1 lb. folding carton lard container was on the label or attached to the outside. Neither fulfilled requirements. Though the lard was wrapped with an inner liner, the chances of ruining a recipe booklet were too great to risk inclosure inside the carton. The new carton provides a space in the top of the container between the two lids, where recipe folders or booklets may be inclosed with the assurance that they will reach the home and come to the housewife's attention when the carton is opened.

The inner lid is held in place by projections on the lid which fit into slots in a double carton wall. The outer lid fits over the container and is held in place by a cord which fits into notches in the corners of the upper lid.

This new container has additional advantages over the old container—disadvantages also. The new container requires more space per pound in the shipping carton and in shipment. However, it eliminates the use of an inner wrapper and is therefore more sanitary, less "messy" and more convenient in the kitchen.

Exit Spud Peeling

The cost of distribution is becoming a very important factor in determining the character of food products sold at retail. Conservation of the housewife's time is another determining factor. Both of these, exerting pressure in the same direction, have brought forth important developments in foods and food packages. One of the commonest articles of food not only bears a relatively high cost of distribution, but is also time consuming and inconvenient when prepared in the home. This is the common potato, the purchase price of which includes transportation costs for the water constituting more than 80 per cent of the potato's weight. And next to washing dishes and pans, peeling potatoes is about the most disagreeable of the housewife's kitchen tasks. Roger Bros. Food Products, Idaho Falls,

Idaho, takes the water out of potatoes before shipment. Packaged in transparent cellulose bags, "Idaho Potato Shreds" for making mashed potatoes in seven minutes saves the housewife time and drudgery. Transportation costs on Idaho potato shreds are shaved to a minimum.

Crushed Eastern Peaches

For several decades Western cling peaches have had almost no competition from Eastern peaches, either cling or freestone. The canned Western peach is a delight to the eye. Gold in color, firm in texture, it comes

from the can perfect in shape, whether halved or sliced. The chief disadvantage of the Eastern peach is its less attractive appearance when preserved. Its chief asset is its flavor. "Pleasant Gardens" crushed peaches, product of Spartanburg Canning Co., Spartanburg, S. C., found immediate acceptance when placed on the market last fall. The product is made from Eastern peaches crushed and ready to make into peach shortcake, peach mousse, peach Bavarian cream, ice cream sauce, etc. Pleasant Gardens crushed peaches make no attempt to trade on beauty but seek the flavor-conscious market.

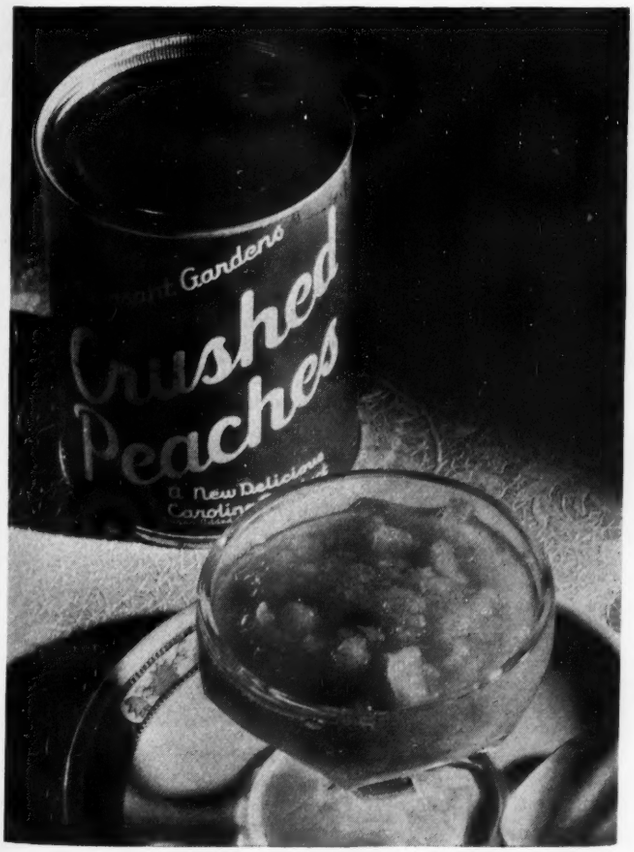
New Type Metamorphosis

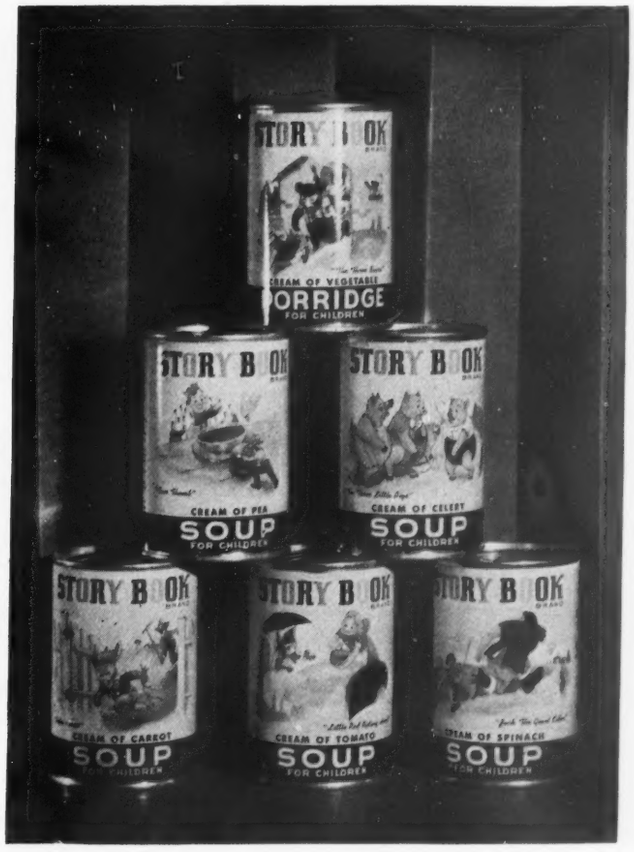
Trends in distribution in the last decade, especially the trend toward self-service merchandising, have encouraged many changes in packaging. Many of these metamorphoses have produced packages which permit inspection of the contents either through the employment of windows in cartons, transparent bags and wraps or clear glass. The container for "Silver Sea" brand boneless and skinless herring tidbits, product of Allison-Bedford Co., Chicago, during metamorphosis shed a wooden pail and emerged in glass, but not transparent glass. The glass jar for

Silver Sea herring is opaque as the result of white color applied to the jar's exterior.

Jr. Labels for Jr. Foods

As the diet's importance to health, growth and development is being discovered by the medico, the importance of the market represented by young folks is also being discovered by food manufacturers. A recent addition to the youngster market is a line of soups which are "edited" for children as well as prepared with special attention to juvenile dietetic requirements. These six vegetable "Story Book" soups—cream of pea, celery, carrot, spinach, tomato and mixed vegetables — carry "family" labels bearing illustrations from child folklore: Peter Rabbit, Tom Thumb, The Three Bears. These are the products of Kemco Products Co., Kokomo, Ind.





Plane More Economical Than Truck

For Winter Delivery on Canadian Border

Routine air delivery service carries perishable products two ways. Prevents drop in winter sales. Trucks also used effectively to expand business.

MOST business men believe that the airplane could never be used economically to deliver the products of their factories. But, like the people at the turn of the century who said the airplane could never fly, they are wrong. Peters Meat Products Co., St. Paul, has adopted as a regular winter weather procedure a coordinated truck-plane distribution system. Employed to avoid an off season sales drop, the system is not of the emergency variety, such as used occasionally in national calamities like floods. It is a practical operation.

The introduction of the airplane into the Peters distribution system was caused by the inability of the company's truck equipment to economically serve the outermost points in its extended delivery area in winter because of the snow along the Canadian border. These outermost delivery points had been added to the company's sales area in the months of mild weather solely through the use of trucks with refrigerated bodies. But when the north wind swept down on these remote settlements, with sub-zero weather, blizzards and often impassable roads, the motor truck, surprisingly reliable as it has become, was not the best means of delivery.

A more economical means was found in the form of the airplane, its economy increased by flying loaded in both directions. Outbound, it carries loads of Peters meat products brought to the local St. Paul airport by the company's own trucks. On the return trips, it brings back loads of fresh fish. These are picked up at the airport by the same trucks and carried to the St. Paul plant of a Peters subsidiary company and finally delivered to the retail fish outlets of the Twin Cities.

So in this instance, the truck and the airplane have combined to offer a quick, economical and satisfactory service in the food field where either means of transportation by itself would have been inadequate. In this connection, it should be stressed that this truck-airplane coordination is not of the emergency variety.

ASIDE from the truck-airplane coordination, trucks have played a most important part in the growth of the Peters company. This company was founded in 1928 as a small, family enterprise. It processed and marketed in a limited area, in and around St. Paul, a small line of meat products, of which sausages was a principal item. At that time the company's distribution equipment consisted of a fleet of four trucks with ordinary bodies. Two of the trucks were used for city and two for country routes.

In the twelve years since 1928, the business, while still a family enterprise, has increased to include two subsidiary companies, the Northwest Casing Co. and the Northern Fish Co., housed in separate plants. Trucks, with their ability to reach out and serve new and more remote markets, have played an important part in the business growth.

The three associated companies now employ 167 persons, as compared with the eleven on the payroll of the original company in 1928. The small line of meat products has increased to 38 items, some of which are sold nationally. The once small market area has been greatly increased and in-

Some of the Internationals in the modern refrigerated fleet of Peters Meat Products Co., St. Paul, Minn., which has enabled that company to greatly expand its delivery area and increase its sales volume. Thirty-three trucks make up the fleet, as compared with four trucks in 1928. During 1939 each truck in the fleet covered an average mileage of 50,000. A total of 4,987,000 lb. of meat was delivered. The trucks are painted a light cream color.

Each winter season when the snows close many of the roads along the Canadian border north of St. Paul, Minn., and make it difficult or impossible for trucks to get through, the airplane flies the orders of the Peters Meat Products Co. to remote delivery points. Here we see one of the Peters trucks transferring its load at the snow covered St. Paul airport. The airplane flies loaded both ways, bringing back from the border points loads of choice fresh fish. Peters trucks deliver this fish at premium prices throughout the St. Paul market area, thus completing the cycle of a profitable truck-airplane coordination.

One of the International trucks on which the Peters company has standardized. All of the trucks have modern, insulated and refrigerated bodies which assure the freshness of the company's meat products at the most remote delivery points, even in the hottest summer weather. Notice the divided curtain which helps to retain the cool air inside the body when the rear door is opened.

cludes many out of the way points along the Canadian border. Sales branches have been opened in Detroit Lakes, Crookston, Duluth and other principal towns of the Iron Range.

Most of the retail outlets are served by Peters trucks operating out of the St. Paul plants and from the sales branches previously mentioned. More remote points are covered by the airplane service. It is from the latter points that the fresh fish are picked up and delivered to St. Paul on the same day or the day after, being taken from the cold northern lakes. This quickness of delivery assures high quality in the product, which justifies top prices.

The present Peters fleet numbers 33 trucks, as compared with the four operated in 1928. Each truck is equipped with a modern refrigerated body. In fact, the Peters company was one of the first of its kind to inaugurate a refrigerated delivery system.

Each year, as new trucks were bought, the most improved type of body was installed. And at the present time the fleet is one of the most modern of its kind in the country. Some idea of the extensiveness of the delivery area may be had from the 1939 operations in which 33 trucks averaged 50,000 miles each during the year. These trucks delivered a total of 4,987,000 lb. of meat products.

The company attributes much of its growth to its delivery fleet and to the use of refrigerated bodies. These bodies preserve, in all kinds of weather and even to the most distant delivery point, the freshness and original flavor of the company's various products.

As to truck make, the company has used eleven different makes in its twelve years of operation. At present, most of the units are 1½ ton Internationals, and the company has now standardized on that make.

In keeping with the now almost general trend, the Peters trucks are painted a light cream color to suggest the cleanliness and purity of the products carried. The body lettering is in a contrasting color and includes the company's trademarked style of the words "Peters Delicious."

The refrigerated bodies are made separately from the cabs and are of the latest design, with a round edge roof, rounded front corners and a pleasing, but not extreme, beaver-tail rear end. One door at the rear and another on the right side provide for both sidewalk and rear-end delivery, whichever is the more convenient.

While the floor of the body is set almost directly on the top of the chassis frame, the body is skirted at the bottom on the outside, the bottom line being level with the cab running-board. Notwithstanding the light paint color employed, this skirting gives the body a pleasing, low, streamlined appearance.

To make it easier for the driver salesman to get his orders out of the body at delivery points, steps are recessed into the body skirting below each door. These recesses and steps are painted black so as not to show scuffing.

Fats and Oils Battle For Food Industries Market

Technical, economic and political weapons used in competitive struggle influence the choice of fats and oils for food manufacture

By GORDON W. McBRIDE
Chemical Engineer, Washington, D. C.

This is an article on
RAW MATERIALS

It is of interest to makers of

Bakery Products
Dairy Products
Fishery Products
Margarine Meat Products
Nut Products
Salad Oils and Dressings
Shortenings Vegetable Oils

Because it deals with the many economic, technical and political factors that affect the price and availability of various fats and oils, which are among the most important of all food raw materials.—The Editors.

Part II*

IN the food industries, choice of an edible fat is most likely to result in selection of butter, margarine, lard, or manufactured shortening (hardened vegetable oil). These four shortenings are not completely interchangeable, especially from a flavor point of view. But from the point of view of necessary fat content in many manufactured products, a considerable degree of intercommodity substitution is entirely practical. In selecting food formulas, therefore, the plant executives and sales management consider how to get the most economical combination of these fats along with maintenance of the desired properties and flavor of the product they intend to produce with them.

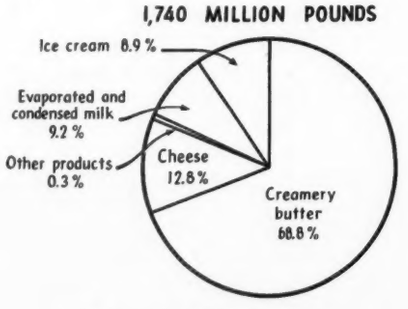
The Four-Fat Fight

Since the competition between these four fats is very largely governed by the supply and prevailing price for butter, it is of importance first to analyze those factors in the dairy industry which determine how much butter will reach the market, and at what price. The accompanying charts and data give full statistical background from which the following conclusions can be drawn:

Butterfat is the biggest factor in the food fat and oil consumption. It is not only the largest single item of fat and oil used as such, that is as butter; but it also supplies 150 per cent more butterfat than this in the form of fluid milk and cream, ice cream, cheese, and other dairy products that are not normally considered as competitive with other parts of the fat and oil portion of the diet. Presumably, if there were enough butterfat available at a suitable price this commodity would replace a very large part of the lard, hardened vegetable oil, and margarine which is now used in food manufacturing. This is not physically possible, as the butter is not available. And at present prices it would not be economically possible either.

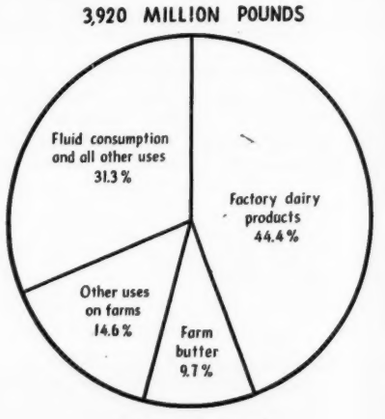
Hence the food manufacturer buying these materials is confronted with a serious competitive problem. The ultimate decision of the food manufacturer, if it is a wise one, will be based on both technical and economic factors. But, unfortunately, he cannot ignore some of the political and psychological considerations which have been discussed briefly in the first part of this article. (See FOOD INDUSTRIES, February, 1940, p. 60)

Perhaps it is safe to generalize by saying that butter has a definite advantage over the other competing fats only when its flavor or psychological contribution is an essential part of the service which it renders. Obviously, leaf lard and hydrogenated cottonseed oil cannot compete on that basis since they do not contain the color and flavor components which are a natural part of butter. Lard, how-



Butterfat Equivalent of Manufactured Dairy Products

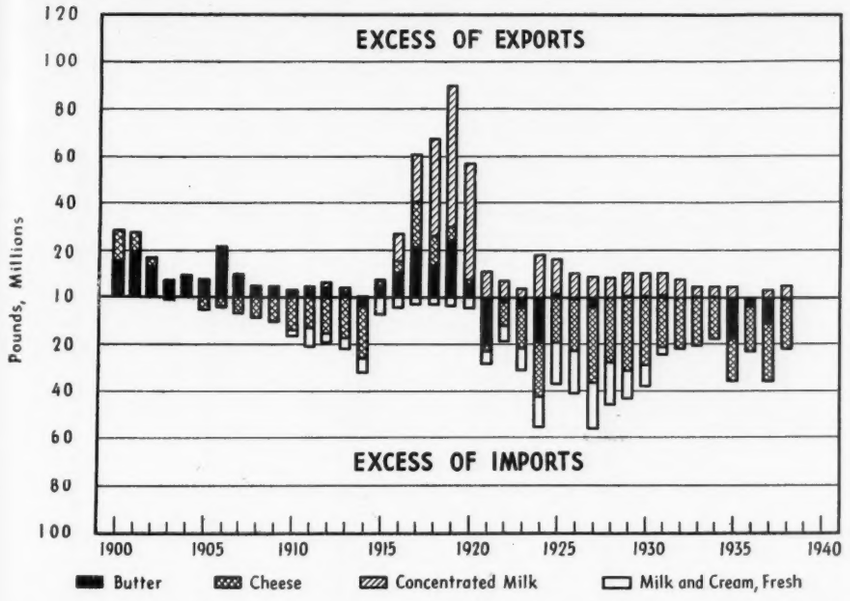
Creamery butter production accounts for more than two-thirds of all the butterfat used for producing manufactured dairy products. Cheese, evaporated and condensed milk, and ice cream account for nearly all of the remainder. Based on data from the Bureau of Agricultural Economics.


3,920 MILLION POUNDS
Fluid consumption and all other uses 31.3%
Factory dairy products 44.4%
Other uses on farms 14.6%
Farm butter 9.7%

Utilization of Total Butterfat Produced

More than half of the butterfat produced in the United States is used in the production of butter, cheese, and other manufactured dairy products. Practically all the rest is used in fluid consumption as milk or cream, except for a small quantity fed to animals on farms. About one-fourth of the total supply is used on the farms where it is produced. Based on data from the Bureau of Agricultural Economics.

* Part II of this article was originally announced to appear in the April, 1940, issue of FOOD INDUSTRIES. A change in schedule has made possible earlier publication of this concluding part of an article, the first part of which appeared in FOOD INDUSTRIES for February, 1940.—The Editors.



United States Foreign Trade in Butterfat for the Years 1900–1938.

During the past 30 years, except for the period of the World War, imports of dairy products have exceeded exports. The most persistent trade is in imports of foreign types of cheese. Imports of butter have been a relatively large part of total imports when domestic prices have exceeded foreign prices by more than the tariff rate. Fresh milk and cream imports from Canada were relatively large during the 1930 decade. Since the World War period, exports have been primarily in the form of concentrated milks, but in recent years exports of these products have declined. Based on data from the Bureau of Agricultural Economics.

ever, does contain other flavor ingredients that some feel should be given large credit in determining fat choice among shortenings.

Formula Making

One of the major jobs of the food fat supplier in recent years has been the development of food formulas in which most advantageous use can be made of the particular fat that he sells. The "high-ratio" fats developed by vegetable oil shortening manufacturers are an outstanding example of this advance and service to the baker. Today, using these improved fats with suitable formulas, the baker can get "better-than-homemade" results on certain cakes and other baked goods. But mere substitution, pound for pound, of the new fats for the old is not enough. There must be the corresponding modification in quantity and character of flour, sweetening agent, egg and milk constituents, and other parts of the formula, and a new mixing technique must be developed and employed.

Another example of the ingenuity of the vegetable shortening manufacturer is probably even better known. For some time it has been a common practice in the baking industry to use skim milk and a manufactured shortening instead of whole milk. The total food value of this combination is the same as for whole milk, and the flavor, texture, and marketability of the product can be equally satisfactory whichever method is used. The baker and the consumer thus gain by this substitution of vegetable fat for the more expensive animal butterfat. Of course, dried skim milk can be used in the same way as liquid skim milk, by reconstitution either before or after mixing into the formula.

Not a negligible factor in all of this food fat competition is that of the keeping quality of the foods produced. For products like cookies and crackers, the long-time resistance to staling and rancidity must be taken into account. This is especially important in the warm season and for goods that go to semi-tropical areas. But for all baked products, there is the essential consideration of retaining oven-fresh characteristics for the longest possible time. In general, baked goods containing the hardened vegetable oils keep better than those made with the animal fats because they contain less of the unsaturated, reactive fats.

By approaching chemical stability, hydrogenation also modifies the physical properties of the fats. A much sharper melting point is obtained in one completely hardened mixture than in another partially hardened mixture which has the same consistency at ordinary room temperature. The normal consistency of the fats and the plastic range of any given shortening are thus factors on which technology has considerable influence. For example, lard can be easily handled in a temperature range which is much broader than that in which the manufactured shortenings can be handled with the same ease. To compensate for this, however, the keeping quality of the manufactured shortenings at room temperature is better than that of lard. Refrigeration is thereby unnecessary for the hardened vegetable oils, although the bakery temperature requires closer control for proper consistency at time of mixing.

Such characteristics as absorption of frying fats by food being fried and stability of frying fats in use in frying kettles have been the objects of considerable research. The use of fats and oils in frying is quite extensive, both in pan frying and in deep frying. Competition among the food fats and oils is keen, with claims of superiority propagated by each. The development of a product which has all the properties specifically desired in the perfect frying fat—low absorption, no smoking, long life, good keeping qualities—would be technology at its best.

Technologic Competition

So far only the consumers of fats and oils in the food industry have been considered. There is also strong competition between fats and oils from the standpoint of the producers. Interchangeability of the fats and oils is a frequently discussed question. Research is continually going on to adapt old fats and oils to new uses and to adapt new fats and oils to old industries. The technology of fats and oils in general is, therefore, undergoing continual change. Although no two oils have identical properties, finished products of similar properties can be obtained by blending different oils in varying proportions. The degree to which this interchange of fats and oils is possible depends on the knowledge, skill, and degree of technologic development within a given industry.

It was technology which made possible the development of margarine and vegetable oil shortenings to compete with the "natural" animal fats—butter and lard. The vegetable oils were quickly recognized as vigorous competitors, and their unvarying quality in refined form is still a major handicap to the animal fat marketers. Very little can be done to control the quality of butterfat produced by the cow, but the competing margarine was quickly stamped by the dairy industry as "an inferior substitute."

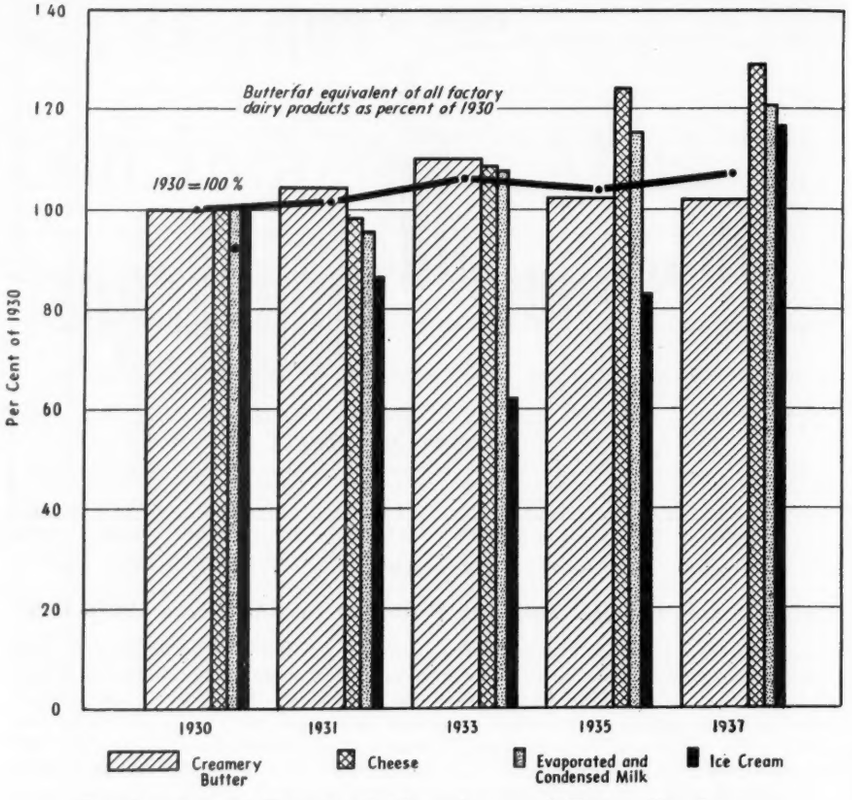
Through political means the technologic competition has been rendered definitely uneconomic. Some still hope that the discriminatory taxes may some day be removed; but this is likely to come only when those agricultural interests which could supply the margarine raw materials profitably are both well-organized and politically vocal.

On the other hand, when competition from vegetable oil shortenings began to be serious, the processors of lard adopted the attitude that while lard was pretty good stuff, it might just possibly be improved. (See *Food Industries* **11**, 438, 1939). By research, both on the animal production and on the subsequent processing, this possibility is being realized and the competitors are actually letting the merits of their respective products speak for themselves. Technology here serves both sides. Economics will decide the issue, first one way and then another.

Byproducts and Co-products

Technologic consideration of the fats and oils is determined by several factors. For example, in the case of coconuts, oil is the primary product and anything which could be done to improve the quality or quantity of coconuts would be with the oil in mind. Cottonseed oil, however, is no more than a co-product of the cotton fiber, though it is still a very important one; thus effort must be divided between improving the cotton and improving the cottonseed. When corn is the commodity being considered, the oil is usually regarded as something of a nuisance by the starch maker. Any decrease in the proportion of oil contained in the kernal of corn would probably be welcomed, especially by the small grinders. However, the oil that is present must be recovered efficiently and sold at the best possible price in the interest of low net cost of starch production. It is far too valuable a commodity to be wasted.

Byproduct and co-product relationships are extremely important with various fats and oils. All the fat from the hog is really a byproduct of meat packing, and one which in recent years has had less relative dollar importance than in earlier years. This fat is processed for market with the production of both edible quality lard and the lower quality inedible grease. Obviously, the effort is to make as large a part of the total fat as is practical into the higher price edible class without unduly depreciating the unit price of that lard. To improve the quality of lard even hydrogenation is practiced, though not extensively. Technology gradually advances, changing the relationships; but at all times the economic interrelationships of over-all return to the meat packer govern the decisions.



Production of Principal Manufactured Dairy Products (1930 = 100 per cent)

The width of the bar for each commodity is determined by the ratio of poundage in 1930. The height of each bar then varies with the production for the year in question. Based on data from the Bureau of Agricultural Economics.

In the case of vegetable oils there are like problems. In some cases the oil seeds are themselves byproducts of other industrial activity. For example, as was cited above, cottonseed is produced as an incident to cotton growing. At times, Southern agriculture has wished that it did not produce any seed; but in recent years, with lower prices for cotton, there is the question as to whether seed may not be more profitable to the cotton grower than the cotton itself. Furthermore, when the seed is pressed, meal is left which may be sold for either feed or fertilizer. Thus, the costs of oil and meal as co-products necessarily influence each other, and the ability of the cotton-seed crusher to get a high feed price for the meal, rather than a low fertilizer price for it, largely determines the net cost of production of the oil. This in turn determines its competitive market position and the chance for the seed crusher to make money by his sales to the shortening manufacturer. Hulls and linters are factors also, but together probably account for less than 10 per cent of the return to the cottonseed crusher. In other words, the producer of cottonseed oil is in a complicated, multi-product business. Calculation of the cost or of the profit made on the oil is a matter of bookkeeping, and is based upon changes that must be arbitrarily assigned to one or another of the several products.

The successive markets for butterfat also illustrate the co-product relationship very well. The dairy man endeavors to sell his product wherever it will bring the best price, a practice which is axiomatic with any business. The fluid milk and cream market pays the best price for butterfat, so this is his first choice. Manufactured milk products represent a fair outlet for second choice. Finally, when all other markets are filled, what is left of the butterfat is processed into butter and sold for what it will bring. Balancing these several markets, to obtain the maximum return, is the problem of the dairy man; here butterfat competes with itself in various forms.

Research

A survey has recently been made of all the research which is taking place in this country on fats and oils, in

connection with the establishing of the four Regional Research Laboratories of the Department of Agriculture. This survey included research not only on all domestically produced fats and oils but also on those which are imported.

The field in which most interest is centered is cottonseed. This is natural enough since cottonseed is produced in larger amounts than any other domestic oilseed. Considerable work, however, is also being done with peanuts, flaxseed, soybeans, castor beans, tung nuts, corn germs, wheat germs, olives, and sunflower seed.

Imported oils are also being studied and the possibility of producing new oils in this country is being considered. In some cases it is realized that the climate or economic conditions will not permit domestic production. In many cases the oil or fat is of comparatively recent commercial significance and very little has yet been discovered or published. These miscellaneous oils include, among others, babassu oil, perilla oil, rapeseed oil, oiticica oil, hempseed oil, sesame oil, chia oil, safflower oil, jojoba oil.

In addition to this work on vegetable oils, considerable research is also being done on the physical and chemical characteristics of animal fats, dealing with such factors as color, composition, titer and rancidity. These studies are being undertaken principally to increase the non-food utilization rather than to increase the edible consumption. This is based on the little appreciated fact that people can eat only so much; that is, if one food gains, another one loses.

The present lard surplus is inspiring an interesting example of this type of research. Suggestions have been made that a type of hog be raised that has less fat and thus will produce less lard for a given pork production. The effect of different types of feeding on the kind of fat produced is also being studied.

Industry realizes more and more the importance of a long range fats and oils research program. Work commenced now may not increase profits next year, but experience has shown that the successful laboratory experiment of today is the industrial practice of tomorrow. There is need for fundamental studies of fats and oils with respect to the composition and structure of the molecules, their analysis and synthesis, and their properties in purified form. The minor components of the fats and oils must be investigated, the pro- and anti-oxidants, the vitamins, and the substances which impart the characteristic colors and odors.

The physical and chemical properties of the fats and oils must be better known for more intelligent utilization; viscosity, thermal conductivity, dielectric constants, migration of double bonds, addition of various elements and compounds, modification of properties—all must be studied. Methods of oil recovery and refining are not the least important on the list of items deserving attention. Of course, substitution of domestic oils for those which are now necessarily imported is the goal of many already engaged in research. Of outstanding importance is research by users of fats and oils to determine their needs, as well as the methods of use of the fats and oils which they can buy.

Consideration of such a research program only serves to accentuate the competition among the fats and oils. It is a comprehensive, ideal goal at which to aim. It is a preview of industrial utilization of fats and oils 25 years from now. A shortsighted view must not be taken in respect to the competition between domestic animal fats and domestic vegetable oils. They are all products of agriculture, and one economical source of fats and oils cannot safely be indefinitely restricted for the benefit of another more costly method of supply.

Table IV—Consumption of Principal Food Fats

Although the total consumption of the principal food fats is increasing, the per capita consumption has not varied greatly during the past decade. The droughts of 1934 and 1936 seriously diminished the lard supply, however, with the result that the recent consumption of manufactured shortenings exceeded the lard consumption, to maintain the total nearly constant. Data from the Bureau of Agricultural Economics and the Bureau of Internal Revenue (margarine).

Total Consumption in Millions of Pounds

Product	1929	1931	1935	1937
Lard	1,572	1,678	1,218	1,363
Mfd. Shortenings	1,209	1,168	1,541	1,594
Butter	2,117	2,247	2,207	2,158
Margarine	353	230	380	397
Total	**5,251**	**5,323**	**5,346**	**5,512**

Pounds Per Capita Use In United States

Product	1929	1931	1935	1937
Lard	13.0	13.5	9.6	10.6
Mfd. Shortenings	10.0	9.4	12.1	12.4
Butter	17.4	18.1	17.3	16.7
Margarine	2.9	1.9	3.0	3.1
Total	**43.3**	**42.9**	**42.0**	**42.8**

Table V—Forms in Which Butterfat is Consumed

The butterfat consumed as fluid milk includes both farm and urban consumption, about 28 per cent and 72 per cent respectively. The butterfat consumed as butter is on a 100 per cent fat basis, and includes both farm butter and creamery butter, about 25 per cent and 75 per cent respectively. The identical totals for the two years is a coincidence. Computed from data from Bureau of Agricultural Economics.

	1931	1937
	(Millions of Pounds)	
Fluid Milk	1,603	1,624
Butter	1,651	1,577
Cheese	171	223
Evaporated and Condensed Milk	127	160
Ice Cream	116	155
Fed to Calves	111	102
All other Uses	141	79
Total	**3,920**	**3,920**

Table VI—Fats and Oils Consumed in Manufactured Shortenings

These edible fats constitute about 40 per cent of the household and industrial used for cooking. Lard is the major competitor, supplying most of the rest of the market (See Table IV). The rise in use of manufactured shortenings between 1931 and 1937 was probably the result of drought shortages of lard and largely increased supplies of cottonseed oil, not a normal change in habits of use of food fats. Data from Bureau of the Census.

	1931	1937
	(Millions of Pounds)	
Vegetable Oils		
Cottonseed Oil	928.5	1,162.6
Palm Oil	34.5	123.7
Soybean Oil	10.9	90.8
Peanut Oil	6.0	58.2
Sesame Oil	33.8	29.3
Coconut Oil	34.1	12.5
Rapeseed Oil	.....	5.2
Corn Oil	6.6	1.6
Babassu Oil	.....	0.1
Other Oils	18.7	2.4
Total	**1,073.1**	**1,486.4**
Animal Fats and Oils		
Edible Tallow	69.6	66.3
Edible Stearin	27.2	29.7
Lard	8.9	0.9
Oleo Oil	10.0	0.2
Total	**115.6**	**97.1**
Marine Oils		
Fish Oil	16.7	21.3
Whale Oil	2.7	.....
Total	**19.4**	**21.3**
Grand Total	**1,208.1**	**1,604.8**

Table VII—Fats and Oils Consumed in Manufacture of Margarine

Shifts in usage of oils occur according to the relative prices, as here shown for coconut and cottonseed oils. The change between 1931 and 1937 resulted largely from tax burdens on coconut oil of three cents per pound imposed in 1934. Data from Bureau of Internal Revenue, Treasury Department.

	1931	1937
	(Millions of Pounds)	
Vegetable Oils		
Cottonseed Oil	16.0	173.6
Coconut Oil	133.1	73.8
Soybean Oil	0.6	31.8
Babassu Oil	.....	14.6
Palm Kernel Oil	.....	7.9
Peanut Oil	4.6	2.9
Corn Oil	0.1	1.8
Palm Oil	2.4	1.1
Sesame Oil	0.3	.....
Total	**157.1**	**307.5**
Animal Fats and Oils		
Oleo Oil	18.8	12.3
Oleo Stearin	4.9	3.4
Neutral Lard	9.7	1.7
Oleo Stock	0.8	1.3
Other Fats and Oils	0.3	.....
Total	**34.5**	**18.7**
Grand Total	**191.6**	**326.2**

Short-Time Pasteurization

As It Looks to the Milk Plant Operator

By W. D. DOTTERER
Bowman Dairy Co., Chicago, Ill.

This is an article on
PASTEURIZING

It is of interest to makers of

Ales and Beers
Butter and Cheese
Carbonated Beverages
Fruit Juices
Milk, Cream, Ice Cream
Mineral Waters
Wines

Because it gives the results of tests carried out to compare the familiar 30 minute holding-period method of pasteurization with the newer continuous, time and space saving short-time method—The Editors.

Part II*

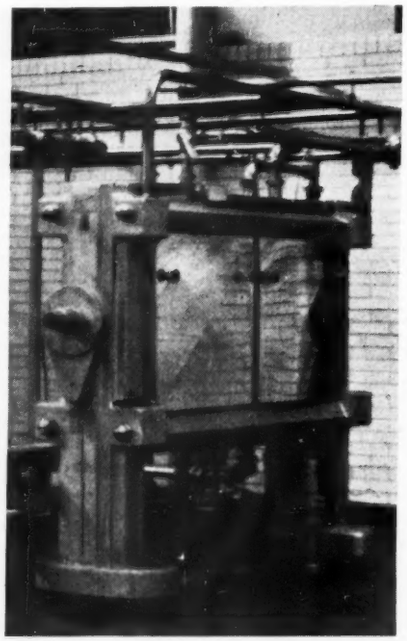
STRAIGHT comparison of the short-time pasteurization with the 30 minute holding period method is found in the Table III summary of percentage reductions obtained in 200 tests made in December, 1938. On the face of these results, the 30 minute holding period method has the advantage of a 3.51 per cent difference in reduction effectiveness. However, milk No. 7 gave a result so far out of line with the other tests that perhaps an undetected error was made, and that result should be discarded. If that is done, the average effectiveness of the short-time method becomes 96.1 per cent and is almost on a par with that of the 30 minute holding method.

Even though the percentage reduction data show only a small, if any, advantage in favor of the 30 minute holding method, the individual bacteria counts indicated a greater advantage.

* Based on a paper read before Chicago Dairy Technology Society.

Experience with the two methods leads us to believe that thermoduric organisms resist short-time pasteurization to a greater extent than they do the 30 minute holding treatment. Thirty minute holding does not kill all heat resistant bacteria, but their survival is not generally so noticeable when that method instead of the short-time method is used. Further experience with the short-time method may disclose a way to overcome that handicap.

Considerable work has been done on the problem of thermoduric bacteria. Their source has practically always been found in improperly cleaned and sterilized farm utensils. Such utensils need not be in a seriously bad condition to cause trouble. Short-time pasteurization may eventually, if generally adopted, result in better care of farm utensils. Also, contamination of milk by thermoduric bacteria probably results from improperly cleaned and sterilized plant equipment.



Two plate heat interchangers of this type are used to pasteurize milk by the short-time high temperature method at the Bowman Dairy Co. plant. The two units handle 28,000 lb. of milk an hour.

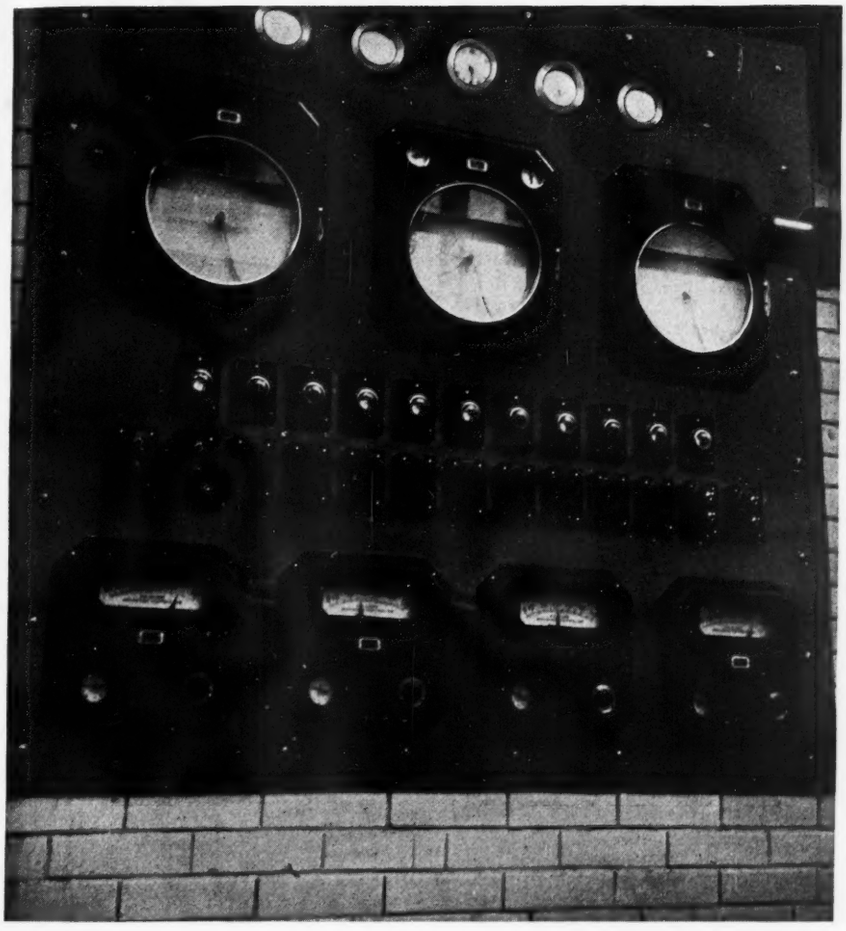
Reports on performance of short-time pasteurizers in other plants state that clarification possesses a distinct advantage over filtration for the removal of bacteria. To verify this point, a series of tests was run on raw milk before and after clarification in which a no-foam clarifier was used. In operation, the raw milk was passed through the regenerator where it was heated by the pasteurized milk to about 137 deg. F. before going to the clarifier and on through the rest of the pasteurizing operation.

Samples were taken after the regenerator and after the clarifier to ascertain any effect of heat upon the bacteria content which might take place during the time the milk was passing through the clarifier, a period of about 10 seconds. Considerable variation was found in the effect of clarification upon the removal of bacteria from the milk. No attempt was made to determine the reason. Mechanical removal plus the effect of 137 deg. F. for 10 seconds gave an average reduction of 52 per cent. These results compare favorably with those reported from other plants where clarifiers are in use.

Since "creaming" plays such an important part in the salability of milk, a series of runs was made to compare the effects of short-time pasteurization with those of the 30 minute holding

Table III—Bacteria Killing Effectiveness of Short-Time and 30 Minute Holding Pasteurization.

Milk No.	Percentage reduction	
	Short-time	30 min. holding
1.	96.20	99.21
2.	96.45	97.50
3.	90.70	95.00
4.	98.74	99.40
5.	98.40	98.00
6.	98.40	98.00
7.	71.00	93.00
8.	96.28	98.16
9.	93.60	93.25
Average.	93.31	96.84



These instruments safely control the short-time high temperature pasteurization process at the Mayfair plant of Bowman Dairy Co. The Bowman short-time installation will pasteurize 28,000 lb. of milk an hour.

method upon the cream line of milk. Milk from the same vat was used in both methods. From the results, summarized in Table IV, the 30 minute holding method, when filtered milk is used, shows a slight advantage over the short-time method when clarified milk is used.

These results gave rise to speculation on the effect of clarification and filtration upon the creaming ability of milk. The effect of these operations on milk treated by the short-time method (Table V) indicates less injury to the cream line when the milk is clarified. But the reverse is indicated (Table VI) when the milk is filtered. However, the difference in favor of the short-time method is too slight to be significant. The significant conclusion to draw from results given in Tables IV, V and VI is that the clarifier has an injurious effect on the creaming ability of milk.

Since present indications are that the short-time pasteurization needs the help of the clarifier to keep bacteria counts low, a slight sacrifice in cream volume may be necessary when the short-time method is used.

Although the results of all the test runs reported here indicate that short-time pasteurization can be used in place of the 30 minute holding period method, there are limitations which may be of importance under some circumstances.

If very low bacteria counts are of first consideration, short-time pasteurization will have difficulty in competing successfully with 30 minute holding. If thermoduric organisms can be eliminated from the milk supply, short-time pasteurization should be entirely satisfactory. While the margin of safety seems to be less in the short-time method than in the 30 minute holding method, the control apparatus has been perfected to such a degree as to well provide for safety.

Experiments conducted by the U. S. Public Health Service and other authorities have shown the method to be safe. When health authorities are very strict in their requirements on bacteria counts, it is well to know that thermoduric bacteria can be controlled before the short-time system is installed. Also, for those in a questioning frame of mind, it is well to know that short-time pasteurization has advantages which may well outweigh some of the strict requirements for low bacteria counts. As stated previoutly, these advantages are of an engineering and operating character.

Correction

Part I of this article, "Short-Time Pasteurization As It Looks to the Milk Plant Operator," published in the February issue of FOOD INDUSTRIES, should be corrected as follows: In the last paragraph in the center column on page 47, substitute "16 second holding period" for "30 minute holding period." This is in the fifth line of the paragraph.—The Editors.

Table IV—Comparative Effects of Two Pasteurization Methods upon Rise of Cream on Milk.

Milk No.	Per cent of cream volume	
	Short-time (clarified)	30 min. holding (filtered)
1.	12.53	13.30
2.	12.89	13.31
3.	13.10	12.88
4.	12.72	12.88
5.	12.80	13.08
6.	12.43	13.14
Average	12.74	13.09

Table V—Comparative Effects of Short-Time Pasteurization upon Rise of Cream on Clarified and on Filtered Milk from Same Receiving Vat.

Milk No.	Per cent cream volume	
	Clarified	Filtered
1.	13.13	13.15
2.	12.09	13.25
3.	13.75	14.27
4.	13.00	14.50
5.	13.50	14.00
Average	13.09	13.83

Table VI—Comparative Effects of Two Pasteurization Methods upon Rise of Cream upon Filtered Milk.

Milk No.	Per cent cream volume	
	Short-time	30 min. holding
1.	13.55	13.55
2.	13.71	13.02
3.	13.81	13.71
4.	13.20	13.02
Average	13.57	13.43

The Food Industry News

Recommends Certificate Plan to House Committee

"I recommend marketing certificates for your earnest consideration, not as a substitute for any part of the farm program but as a greatly needed addition." In those words Secretary Wallace proposed his certificate processing tax plan to the House Agriculture Committee on Feb. 15. Needing more funds to finance his farm program, which last year cost about a billion dollars, the Secretary suggested his certificate plan as the best solution. He likes it better than the alternative methods of price fixing or high loan rates. He criticized direct appropriations for agriculture because of the uncertainty that Congress will provide all the income needed by the farmers. The certificate plan, in the opinion of Mr. Wallace, would avoid the danger of interference with the trade agreement program, would avoid the undesirable encroachment of government upon business functions and would help to avoid interference with the competitive position of the product in the market.

The plan would be applied to wheat, rice, prunes, raisins, cotton and tobacco. It would not be used for corn, because that commodity does not pass through a centralized manufacturing process, Mr. Wallace said.

Holds Canned Fruit Hearing

Preliminary information was obtained by the Food Standards Committee at its informal meeting of Jan. 29 on standards of identity, quality and fill of container both for canned fruits for salad and for canned fruit cocktail. Proposed standards were submitted by the Canners League of California specifying fruits and proportions.

Better Flour Developed

A new flour, credited with higher nutritional value than whole wheat flour, yet possessing the lightness of white flour, probably will be on the market soon. This new flour is produced by adding to white flour vitamins B_1 and B_2, nicotinic acid, calcium, phosphorus and iron. The product of a year and a half of research by millers, medical men and food technologists, the flour has been approved by the Federal Government and it is expected to get the endorsement of home economists and doctors.

$500,000 FIRE

Two days before the opening of the first unit of the new $2,000,000 Buffalo cereal plant of General Mills, Inc., a disastrous fire broke out, raged for 14 hours and did damage estimated at between $500,000 and $750,000. The fire, which started on Feb. 15, will delay opening of the mill until early summer. While the building itself was fireproof, it was filled with materials such as sugar, sirup, waxed paper, cartons and promotion material. Practically all of this was destroyed, and machinery in the mill was materially damaged. The picture shows the fire on the second day.

This fortified white flour was first announced at the recent meeting of National Soft Wheat Millers Association. And this group has appointed a committee to determine whether the product should be marketed under a common trade name adopted by the association or under private brand names.

Government Charges Swift With Labor Act Violation

Charging overtime employment without overtime pay, the Wages and Hours Administration applied in the Federal District Court at Chicago on Feb. 19 for an injunction to restrain Swift & Co. from alleged violation of the Fair Labor Standards Act. The complaint alleges that many of the 5,000 workers in Swift's Chicago plant have been employed longer than 42 hours a week without receiving time-and-a-half pay for the excess hours. And it contends that this has given the company an unfair competitive advantage.

Other meat packers are under investigation. And the issue involves about 150,000 employees and between three and four million dollars in back wages in the industry, according to Thomas O'Malley, regional director of the administration. The question is largely one of interpretation of exemptions.

Institute of American Meat Packers, Wilson & Co. and Cudahy Packing Co. have indicated that they will seek to intervene.

Armour Maintains Stand In Agreement with Union

After facing for several months the threat of a strike in its Chicago plant, Armour & Co. has reached a mild "memorandum agreement" with the union. Armour "has not budged an inch," says President George A. Eastwood, in its refusal to sign a contract with Packinghouse Workers Organizing Committee (CIO). The company has rejected the demands of the union for a signed contract, closed shop, check-off, wage increase and reduction in hours, according to Mr. Eastwood. Only minor changes in policies and practices have been put into effect.

The principal points in the agreement are:

1. Strengthening of the seniority system by allowing workers to retain seniority and vacation rights through periods of unemployment up to one year. Previously, these rights were lost after a 60 day unemployment period.
2. The vacation period was extended from April 1 to Oct. 31. The period had been from April 1 to Sept. 31.
3. An employee working Monday and Tuesday of a given week is guaranteed work or pay equivalent to a 32 hour week for that week.
4. The company and the union agreed upon a plan for settlement of grievances in the plants.

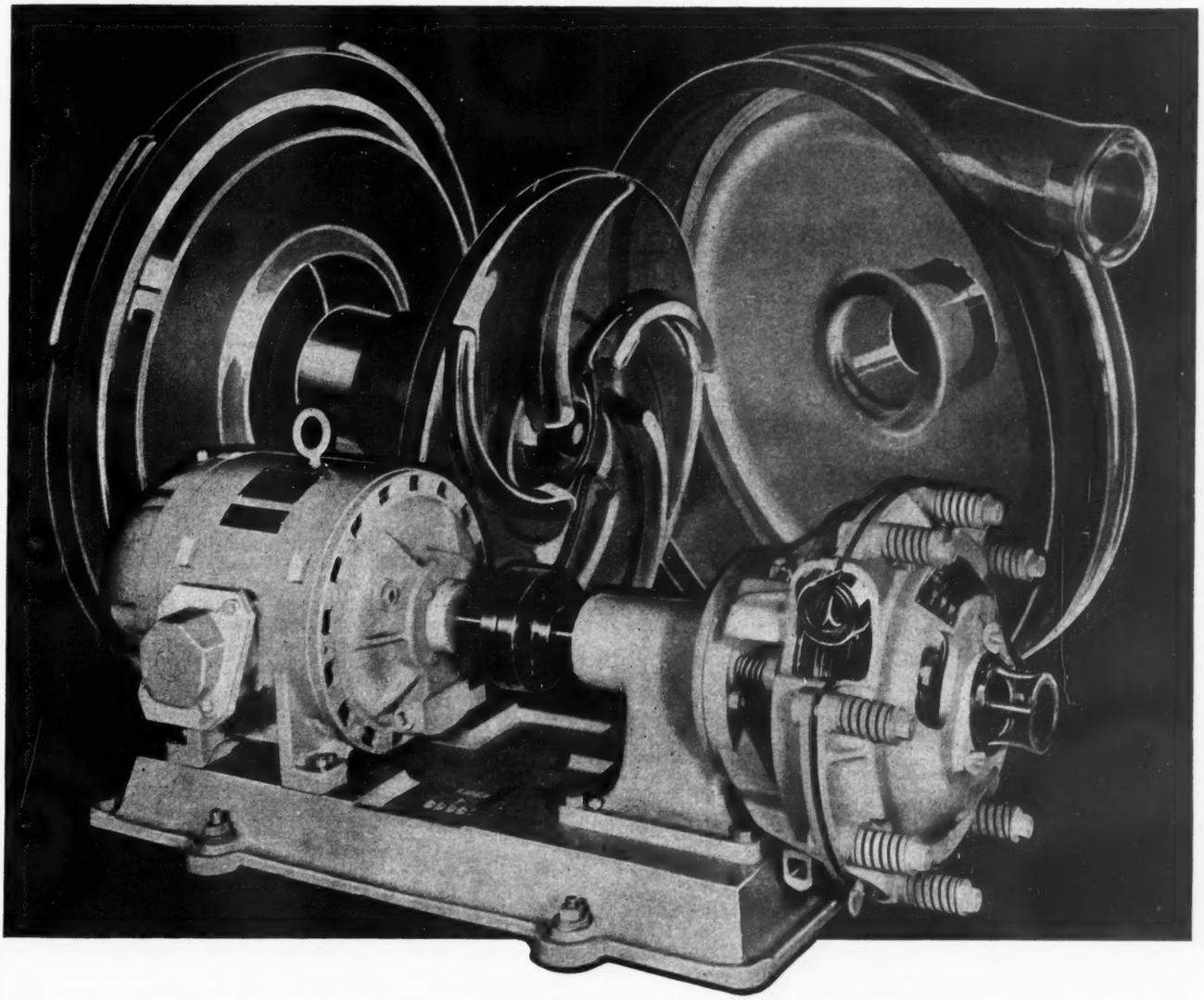
The union will attempt to negotiate similar agreements in fourteen other Armour plants.

British Extend Import Curb

More foods have been added to Britain's list of those which may be imported only under license. They include dried fruits, and lard, bacon and ham in airtight containers. Among the

The Nash *Pump of Glass*

is *transparent*, permitting constant check of color, sedimentation, etc.



Casing and moving element of this remarkable centrifugal pump are of "PYREX" brand heat and shock resisting glass. Perfect transparency permits constant observation of the interior of this pump and the material being handled. • The balanced glass impeller, rotating at 1760 R. P. M., delivers 6000 gallons of acid or other liquid per hour against a 65 foot head. • Hot acids, or brine cooled liquids may be pumped with equal facility. If cleaning is necessary, pump can be taken apart in a few moments. Reassembly is as quick, and adjustment is almost automatic. • There are many more exciting facts about this successful non-metallic pump. Write for your copy of Bulletin D-313 now.

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dried fruits affected by the ruling are currants, apples, apricots, nectarines, peaches, pears, plums and prunes, fig cake, figs, dates and Muscatel and Sultana raisins.

Oleomargarine Defined At Standards Hearing

The Food Standards Committee held an informal open meeting on Jan. 26 for the purpose of self-education on the subject of oleomargarine. Representatives of all the important manufacturers were present.

A definition of oleomargarine, "also known as margarine," was presented and discussed by the manufacturers, with questions interspersed occasionally by the members of the Food Standards Committee. The principal point of discussion was the use of water in the manufacture of this commodity, not as a cooling medium in the wet method of crystallization, which was conceded to be good practice, but as the liquid in which the oils are churned. It was held that the consumer expected milk to be used in the churn; the use of water followed by the addition of flavoring to imitate milk was therefore regarded by some as deception. It was also brought out that water has rarely been used this way.

The use of emulsifying agents, flavorings (for flavor fortification, not as the sole source of flavor), vitamins, and preservatives also was discussed. No one had any comments or questions on the color of the product, whether natural or artificial. The standard suggested by industry spokesmen was:

Oleomargarine, also known as margarine, is a food with a plastic, semi-solid consistency, prepared from one or more wholesome edible fats or oils churned, emulsified, or mixed with milk, skim milk or other milk products, sweet or ripened, water, or a mixture thereof, with or without salt, with or without harmless preservative or preservatives, with or without edible emulsifying agent or agents, with or without approved color, with or without flavoring and with or without vitamin or vitamins or vitamin concentrate or concentrates. Oleomargarine contains not less than 1 per cent of moisture, and not less than 80 per cent by weight of fat, all tolerances allowed for, and in the case of oleomargarine fortified with vitamin A contains not less than 7500 U.S.P. units of vitamin A per pound. This definition and standard of identity shall not apply to puff-pastry shortening not churned or emulsified in milk or cream and having a melting point of 118 deg. F. or more, nor to any of the following containing condiments and spices: Salad dressings, mayonnaise, dressings, or mayonnaise products, nor to liquid emulsion, pharmaceutical preparations, oil meals, liquid preservatives, illuminating oils, cleaning compounds or flavoring compounds.

This meeting represents the first step in the formulation of a standard for oleomargarine under the Federal Food, Drug, and Cosmetic Act of 1938.

Kentucky Drafts Food Law

An annual permit for sale, with a $25 fee attached, and an annual certificate of registration covering all food products may be required of every manufacturer, processor or packer selling food in Kentucky. This is proposed by the Kentucky Food, Drug and Cosmetic Bill now before the State Legislature.

Registration cost is $1 an article, though such fee shall not exceed $100 annually from any one manufacturer. Complete labeling and formula disclosure is required.

Each establishment shall have a separate permit. Fees may be fixed by the State Board of Health for the examination of foods submitted by manufacturers. And in case of prosecution, whenever a sample is found to be adulterated or misbranded, the board shall collect a fee, not to exceed $15, to cover the costs of investigation.

State and Federal Rules Still Found to Conflict

Some meat packers are seriously worried by communications from certain state authorities regarding required labels, especially for canned meat products. These state officials are working under statutes that follow the federal law closely. But they appear insistent on more rapid progress toward detailed enforcement than do the federal officials.

In the case of corned beef, for example, they want a complete ingredients statement on a label, or at least they threaten to demand this, even though the labels in question have been approved by the Bureau of Animal Industry under the federal meat inspection laws. The Food and Drug Administration has not insisted on immediate change of these BAI labels, because BAI is gradually changing over to include ingredient statements as rapidly as meat packing conditions appear to justify the shift.

The packers fear that goods legally shipped interstate may become illegal for intrastate retail sale in some places if the officials of New Jersey, New York and other states carry out their more drastic plans.

Popular Food Stamp Plan Threatened by Economy

Economy in government is proving more popular than Congressmen expected. This fact furnishes a real threat to the plan of extending the food stamp program widely through the

CAPITAL VIEWS

CHEESE TARIFF—The pressure of dairy lobbies in Washington appears again. This time the result is a special countervailing duty on Canadian cheese. The Treasury ruling of Feb. 9 imposes additional duties to offset the Canadian bounties or grants paid to producers in that country. The finding is that these are 1 cent per pound for 93 score cheese and 2 cents per pound for 94 score or better.

FAT AND POULTRY RESEARCH—Original plans for research at the regional laboratories of the Department of Agriculture did not include projects for any animal products except milk. This roused much criticism from poultry people and some protests from the meat products makers. Now the Department announces that the studies at these laboratories will include search for new and extended uses of animal fats and poultry products. The former investigations will be done at the Eastern laboratory, near Philadelphia, and the latter at the Western laboratory, near San Francisco. Thus, lard, poultry and eggs will have their slice of the research cake, with frosting.

EXPORT ASSOCIATIONS CRITICIZED—The Federal Trade Commission is attacking some of the export associations which work under the Webb-Pomerene Law. One of these is specifically charged with illegal practice in that it uses export arrangements to restrain competition in domestic fields. Several previous warnings have been given to various associations that legal export monopolies must not have secondary illegal domestic effects. The desire is not to do away with the export associations but to keep them within bounds. And FTC has a good case if it ever goes to court, it appears.

MONOPOLY FINDINGS—Congress will not attempt any important legislation this year as a general result of TNEC monopoly studies. Even those who are anxious to have some monopoly control results realize that they can get little or nothing before next election. The final report of the committee will, therefore, be prepared more deliberately for use of Congress next year. This means that hearings will continue through the spring, the report will be written in the summer and fall and Congress will find the recommendations waiting for it on its return after election, in January, 1941. Meantime, a few minor legislative efforts may be attempted, but nothing big like Federal licensing of corporations or fundamental antitrust law changes.

FOOD STANDARDS PLANS—The Food Standards Committee which serves as an advisory agency for the Food and Drug Administration is far ahead of the Administration in the foods standards planning. The legal procedures required for formal hearings are progressing so slowly that none of the tentative standards which will initiate important new hearings of this sort are likely to come out soon. Those expected to have earliest action are canned unmixed fruit and canned sea food like oysters, clams, shrimp and fish roe. It is likely to be late spring or summer before mayonnaise, margarine, carbonated beverages, bread and ice cream have formal action.

FOOD TAXES—Despite economy planning in Washington there is still talk that some sort of processing tax on food raw materials may be enacted. But the forecasting of this levy is now much less certain than a month ago. Talk about special taxes on chain stores is even less positive. These merchandising units have gained support from agriculture and are thus in much less vulnerable position than heretofore.

Authenticated News photo

SETTING STANDARDS FOR TEA

Standards for tea imports for the year beginning May 1 were established by the U. S. Board of Tea Experts in a five day sipping and sniffing session, Feb. 5–9, in New York. From 250 tea samples, the experts select ten, and these standards are compared with imports for purity, quality and fitness for consumption under the Tea Inspection Act of 1897. The Board of Tea Experts includes (standing) Charles F. Hutchinson, tea examiner for the government; (seated left to right) George F. Mitchell, Brooklyn; A. T. Irwin, Philadelphia; J. H. Swenarton, New York; R. A. Lewis, Boston; Edward Bransten, San Francisco; and Walter Hellyer, Chicago.

United States. The Department of Agriculture still expects, and hopes for, expansion. But it is worried.

The plan of distributing food as a relief item by two-colored stamps has proven to be a very popular agricultural relief scheme. It is the only one that helped both in the city and in rural areas. Restoration of appropriations for continuance and enlargement of the program should, therefore, be fairly easy. But the snowball of economy may grow beyond the control of the folks who started it rolling through the agricultural money bill.

Originally, the plan was to cut heavily on appropriations for many activities, including agriculture. Then when the defense measures came up for Congressional vote, they too could be cut. After big cuts in defense measures, it was planned to restore in the Senate some of these sacred cows of agricultural spending. The problem now is whether it will be safe to restore the appropriations as planned.

Wallace, supported by agriculture, will fight to the last ditch, and probably he will get back most of the money, especially the food stamp money. If these funds are not granted in the regular appropriation bill soon, they still can be given by "deficiency appropriations" late in the spring, just before Congress goes home again.

Chicago Technologists Meet

Increasing interest is being shown in the meetings of the Chicago Association of Food Technologists. At its third meeting, on Jan. 22, attendance exceeded that of the previous meeting by 40 per cent, with a total of 70.

The technologists attending the meeting were addressed by Dr. L. V. Burton, Editor of FOOD INDUSTRIES, on the subject, "Unit Operations as Basis of the New Profession of Food Technologist." Dr. Burton emphasized the importance of recognizing the part played by the mechanical operations and composition-altering processes involved, regardless of the product being handled or processed.

Ruling on Bakery Labels

The unqualified term "eggs" may be employed in listing the egg ingredient on labels for baked products, whether dried, liquid or frozen eggs are employed. This has been authorized both by the Food and Drug Administration and by the Department of Agriculture in letters to Henningsen Brothers, Inc., New York. The ruling was made because the federal officials recognized the fact that in the finished baked product, after the moisture has been evaporated, the three types of egg ingredients are to all intents alike.

This ruling applies to whole eggs, to yolks and to whites.

Schedule of Current Action on Food Standards

(Dockets 1, 2, 3, 4, 5 and 9 have been completed and dropped from this table*)

	Docket number and commodity	Type of standard or regulations	Presiding officer	A First announced in Fed. Register	B Initial hearing date	C Preliminary briefs due not later than	D Examiner's findings published in Fed. Register	E Secretary's order published in Fed. Register	F Effective date of order
6	Canned peas	Identity, quality, fill	J. M. Fox	Mar. 7, '39	April 17, '39	June 29, '39[1]	Nov. 9, '39[2]	Feb. 24, '40	May 24, '40
7-A	Cream			Mar. 28, '39	May 1, '39	July 27, '39[1]	Sept. 26, '39	.....	.....
7-B	Whipping cream			Mar. 28, '39	May 1, '39	July 27, '39[1]	Sept. 26, '39	.....	.....
7-C	Evaporated milk	Identity	F. S. Hassell	Mar. 28, '39	May 1, '39	July 27, '39[1]	.....	.....	.....
7-D	Sweetened condensed milk			Mar. 28, '39	May 1, '39	July 27, '39[1]	.....	.....	.....
7-E	Dried skim milk			Mar. 28, '39	May 1, '39	July 27, '39[1]	.....	.....	.....
8	Canned vegetables	Identity	F. S. Hassell	Mar. 24, '39	April 24, '39	June 19, '39[1]	Aug. 15, '39	.....	.....
10-A	Fruit jams	Identity	M. F. Markel	Aug. 11, '39	Sept. 11, '39	Jan. 5, '40[1]	.....	.....	.....
10-B	Fruit jellies	Identity	M. F. Markel	Aug. 11, '39	Sept. 11, '39	Jan. 5, '40[1]	.....	.....	.....
10-C	Fruit butters	Identity	M. F. Markel	Aug. 11, '39	Sept. 11, '39	Jan. 5, '40[1]	.....	.....	.....
11-A	Cheddar cheese			Aug. 22, '39	Sept. 25, '39	Dec. 22, '39[1]	.....	.....	.....
11-B	Washed curd cheese	Identity	W. G. Green, Jr.	Aug. 22, '39	Sept. 25, '39	Dec. 22, '39[1]	.....	.....	.....
11-C	Colby cheese			Aug. 22, '39	Sept. 25, '39	Dec. 22, '39[1]	.....	.....	.....
12	Cream cheese	Identity	W. G. Green, Jr.	Aug. 22, '39	Oct. 2, '39	Feb. 5, '40[1]	.....	.....	.....
13	Coal-tar colors[2]	Listing and certification	F. S. Hassell	Oct. 20, '39	Nov. 20, '39	Dec. 22, '39[1]	Feb. 6, '40	.....	.....
14	Coal-tar colors[2]	Listing and certification	F. S. Hassell	Feb. 6, '40	Mar. 11, '40	.....	.....	.....	.....

[1] Time extended from earlier date previously announced.

[2] Amending order of Docket 4.

[3] Standard of identity only, standards of quality and fill of container published in *Federal Register*, Nov. 25, '39.

* Docket 1 pertains to tomato products, 2 to canned tomatoes, 3 to eggs and egg products, 4 and 9 to coal-tar colors and 5 to canned peaches, apricots, pears and cherries. See FOOD INDUSTRIES, October, 1939, page 569; January, 1940, page 70; and February, 1940, page 73, for data on these standards.

Hours Exemption Proposed

Exemption from the maximum hours provision of the Fair Labor Standards Act has been proposed for the Virginia-Smithfield Meat Packers Association. This proposal was made in a finding announced by the Wage and Hour Division of the U. S. Department of Labor in the *Federal Register* on Feb. 10. Seasonal exemption is favored because only peanut fed hogs can be used to make the type of meat needed by these packers, and such hogs are available only from about the middle of November until some time in March.

Mississippi Would Ban Beer

No beer would be manufactured or sold in Mississippi if a bill introduced recently in the Mississippi legislature by Representative Morrow were enacted. This bill, which would repeal the statute authorizing the brewing and selling of beer in the state, has been referred to the temperance committee.

Standards for Bread Proposed at Hearing

The first step in establishing standards for white bread, whole wheat bread, rasin bread and milk bread was taken at a meeting of the Food Standards Committee of the Department of Agriculture on Jan. 31. This committee opened its informal meeting to manufacturers and consumers, for the dual purpose of finding out what was commonly used to make these breads and what the consumer expected to find when buying them.

Speaking for the American Bakers Association, Mr. L. J. Schumaker presented the following recommended standards of identity for the four types of bread being considered:

1. White Bread, White Rolls. The product, in the form of loaves or smaller units, obtained by baking a leavened and kneaded mixture of flour, water, salt and yeast, with or without any or all of the following: Shortening, milk or milk products, eggs or egg products, sucrose, dextrose and/or other fermentable carbohydrate substance. It may also include malt sirup, liquid or dry, malt flour, added vitamins and/or dough conditioners. The flour ingredient may include not more than 3 per cent of other edible farinaceous substance. White bread contains, when offered for sale, not more than 38 per cent of moisture. The name "bread" or "rolls" unqualified is commonly understood to mean white bread or white rolls, as the case may be.

2. Whole-Wheat Bread, Entire-Wheat Bread, Graham Bread. The product in the form of loaves or smaller units, obtained by baking a leavened and kneaded mixture of whole-wheat flour, water, salt and yeast, with or without any or all of the following: shortening, milk or milk products, eggs or egg products, sucrose, dextrose, and/or other fermentable carbohydrate substance. It may also include malt sirup, liquid or dry, malt flour, added vitamins and/or dough conditioners. It contains, when offered for sale, not more than 38 per cent of moisture.

3. Milk Bread. The product, in the form of loaves or smaller units, obtained by baking a leavened and kneaded mixture of flour, salt, yeast and milk or its equivalent (non-fat milk solids, milk fat and water in the proportions normal to milk), with or without any or all of the following: shortening, additional milk or milk products, eggs or egg products, sucrose, dextrose and/or other fermentable carbohydrate substance. It may also include malt sirup, liquid or dry, malt flour, added vitamins and/or dough conditioners. The flour ingredient may include not more than 3 per cent of other edible farinaceous substance. Milk bread contains, when offered for sale, not more than 38 per cent of moisture.

4. Raisin Bread. The product, in the form of loaves or smaller units, obtained by making a leavened and kneaded mixture of flour, water, salt, yeast and raisins, with or without any or all of the following: shortening, milk or milk products, eggs or egg products, spices, flavoring, sucrose, dextrose and/or other fermentable carbohydrate substance. It may also include malt sirup, liquid or dry, malt flour, added vitamins and/or dough conditioners. The flour ingredient may include not more than 3 per cent of other edible farinaceous substance. The finished product contains not less than 3 oz. of raisins to the pound.

Discussion was then opened on the ingredients and methods used in baking the breads, the suppliers of ingredients speaking frequently to augment the bakers' comments. Most of the meeting was devoted to white bread, as nearly all the problems involved were raised in this connection. The discussion of whole-wheat bread showed a wide divergence of names for products which contain less than 100 per cent whole wheat. Some expression in favor of such names as "50 per cent whole-wheat" and "75 per cent whole-wheat" was heard, both by baker and by consumer. Milk bread and raisin bread were discussed only very briefly. Some of the consumers asked for label declaration of all ingredients used in all kinds of bread.

Comprehensive lists of each type of ingredient were submitted by representatives of the suppliers of each. The basic ingredients — flour, water, salt, yeast—were passed over with little comment, as were shortening, milk, eggs, sweetening agents and malt products.

The principal discussion was on vitamins, "dough conditioners" and "other edible farinaceous substance." It was the consensus of manufacturers and consumers that restoration of natural vitamins lost in the flour milling served a useful purpose and that it should be encouraged.

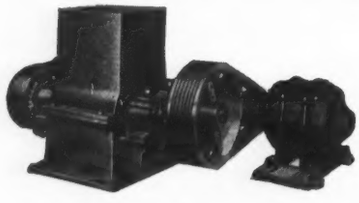
SCHEDULE OF EVENTS

March

7– 9—Canners League of California, Del Monte.
11–14—American Society of Bakery Engineers, Edgewater Beach Hotel, Chicago.
12–14—Conference of Dairy Manufacturers, University of Wisconsin, Madison.
12–15—Ice Cream Short Course, University of Illinois, Urbana.
19–21—Ice Cream Manufacturers' Short Course, University of Minnesota, St. Paul.
26–27—National Creamery Buttermakers' Association, annual, Lowry Hotel, St. Paul, Minn.
26–29—Tenth Annual Packaging Conference, Hotel Astor, New York.

April

9–10—Midwest Power Conference, sponsored by Armour Institute of Technology, Palmer House, Chicago.
9–11—Pacific Northwest Bakers Conference, Multnomah Hotel, Portland, Ore.
12–21—Educational Foods Exposition, International Amphitheatre, Chicago.
14–17—Southern Bakers Association, Edgewater Gulf Hotel, Biloxi, Miss.



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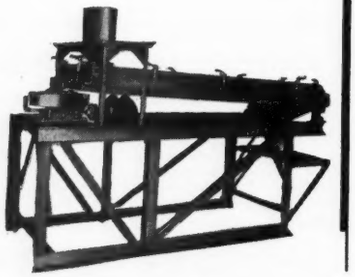

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Egg White from Soy Beans

From the soy bean, the mother of automobile steering wheels, horn buttons and other plastic gadgets, there now comes a substitute for the white of eggs. Reported to American Chemical Society on Jan. 8, the artificial albumen was developed by two University of California women scientists, Betty M. Watts and Doris Ulrich. The method of making the substitute involves the removal from soy bean flour of the protein glycinin. The product produced is a pale yellow powder, which is said to foam to fourteen times its volume when mixed with five parts of water and whipped. The albumen substitute is reported to be tasty in cakes, confections, puddings and meringue.

Program of Packaging Conference

March 26-29, Hotel Astor, New York

UNIT PACKAGING SESSIONS

March 26 Morning Belvedere Room

10:00—"This Little Package Went to Market", Howard Ketcham.

10:45—"The Package: A Vehicle for Consumer Messages", C. W. Browne.

11:30—"How Much Does the Label Weigh?", Jules Labarthe, Jr.

Luncheon Belvedere Room

1:00—"Packaging—a Job for Management", Alvin E. Dodd. Certificates of Award to winners in the Irwin D. Wolf Packaging Competition will be presented following Mr. Dodd's talk.

Afternoon Belvedere Room

2:30—"A Panorama of Packaging Progress", D. S. Hopping. A description and visual demonstration of some recent and significant developments in packaging materials and processes. Among those which will be presented are laminated waxed heat sealing wrappers, transparent rigid containers, Pliofilm-lined coffee bags, the Cryo-Vac Process, lightweight glass, the Stero-Vac process, Protek-Sorb and the Rapal process.

March 27 Morning Belvedere Room

9:30—"Labeling Packages Under the Pure Food, Drug and Cosmetic Act," W. R. M. Wharton.

10:30—"People, Packages and Profit", Faber Birren.

11:30—"Without the Aid of Mirrors", F. E. Irsch, Jr.

Afternoon Belvedere Room

2:00—Packaging Clinic.

PACKAGING MACHINERY AND PRODUCTION SESSIONS

March 26 Morning South Garden

10:00—"Pitfalls in Package Production": liquid filling, Frank B. Fairbanks; dry filling, Carl E. Schaeffer; closures, H. H. Leonard.

Afternoon South Garden

2:30—"Pitfalls in Package Production" (continued): wrapping, G. A. Mohlman; labeling, A. R. Keene; cartoning, C. L. Barr.

PACKING AND SHIPPING SESSIONS

March 27 Morning South Garden

9:30—"The Engineering Aspects of Adhesives", Dr. Frank C. Campins.

10:30—"Fundamental Principles of Protection in Shipping Container Design", W. B. Lincoln, Jr.

11:30—"The Consolidated Freight Classification Rule 41", L. W. North.

Afternoon South Garden

2:00—Questions-and-answers Session.

Morning

Thursday, March 28 Belvedere Room

9:30—"The Technical Aspects and Characteristics of Liner Board", G. T. Henderson.

10:30—"The Receiving Clerk's Angle", Marion A. Eyers.

11:30—"Shipping Department Accessories," R. F. Tettemer.

Afternoon Belvedere Room

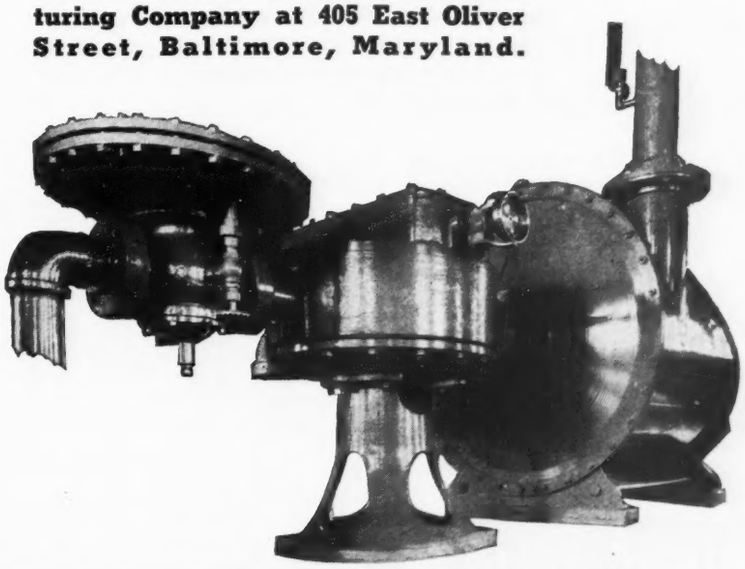
2:00—Packing and Shipping Clinic.

ONE TON per HOUR on 2,000 feet of GAS!

Bakers using the new Greer Automatic Band Oven figure on a ton of production per hour on 2,000 cubic feet of artificial gas. Yes, sir, a pound of any kind of cookies or crackers you want to bake for a foot of gas.

The efficient, new band-oven design is part of the story . . . the other part is that it's fired by Kemp Ribbon Flame Burners on 100 percent premixed gas and air from the famous Kemp Industrial Carburetor. This means complete combustion, absolute temperature control, uniform cross-oven heat distribution.

The Greer Automatic Band Oven is just one more application in which Kemp guarantees to save you money . . . or NO SALE! Whatever your heat-treating problem, it will pay to write . . . **The C. M. Kemp Manufacturing Company at 405 East Oliver Street, Baltimore, Maryland.**



KEMP of BALTIMORE

The VIKING is a Rotary Pump that is self-priming with a positive and steady discharge in capacities of 2/3 1½-3½-5-10-18 20-35-50-90 200-300-450-750 1050G.P.M. in any style you want and will pump ANY clean liquid regardless of viscosity against various discharge pressures

What are your problems?
Send them in
There is no obligation!

VIKING PUMP CO.
CEDAR FALLS, IOWA

Construction News

	Pending (thousands)	Awarded February (thousands)	Total Awarded 1940 (thousands)
Bakery	$60	$100	$140
Beverages	950	1,045	1,235
Canning and Preserving	90	.....	.....
Cold Storage Plants	826	.....	.....
Confectionery	75	.....	.....
Grain Mill Products	680	.....	.....
Ice Manufactured	.....	40	80
Meats and Meat Products	270	.....	.....
Milk Products	235	205	509
Miscellaneous	515	309	1,158
	$3,701	$1,699	$3,122

Drivers Union Refuses Pay Cut, Sues Dairies

Not only did the intentions of the Chicago Milk Wagon Drivers Union to accept a wage cut fizzle out last month, but the union brought suit against six dairy companies in Chicago for what it claims to be $266,000 due members in the form of pay.

The proposed wage cut, to amount to $8 a week, was considered at a meeting of drivers, but was voted down practically unanimously. So the wage remains at $48, at least until May 1, when the contract expires.

The $266,000 for which the union is suing is claimed by it to be the pay due 185 drivers dismissed on March 1, plus $10,000 paid out by the union in unemployment benefits. The union contract, it is claimed, guarantees six months' full pay to drivers made jobless through shrinkage in the number of routes.

The dairy companies being sued are Borden-Wieland, Bowman, Sidney Wanzer and Sons, Western-United, C. J. Wieland & Son and Capitol.

Back of all this difficulty with the union lies the fact that the ratio of store milk to route milk sold in Chicago has shifted from 15:85 to 55:45. Cut price competition supposedly has brought this about, taking away drivers' jobs.

BAI Issues New Order On Treatment of Pork

Pork and pork products which are customarily eaten without cooking in the home or other place of consumption must be treated for the destruction of trichinae. The Bureau of Animal Industry has issued a new order covering methods of treatment prescribed, together with general instructions.

Heating, refrigerating, and curing are given as three optional approved methods of treatment with detailed modifications for various products. Specific temperatures and required holding times and technics are outlined in detail in the *Federal Register* of Feb. 7. These orders supersede all instructions heretofore issued by BAI regarding the treatment of pork to destroy trichinae.

Canned Foods Decrease

According to the January quarterly canned food stock report of the Bureau of Census, canners' stocks of peas, corn, tomatoes, beans, peaches, pears and salmon were lower than on the same date of the preceding year. This report shows that salmon stocks were down 22.7 per cent; peas were down 37.0 per cent; tomatoes, 1.7 per cent; beans, 16.6 per cent; peaches, 30.6 per cent; and pears, 46.9 per cent.

Livestock Values Up

All classes of livestock on farms, exclusive of horses and mules, increased during 1939, and their value now is higher than at any time since 1930. The U. S. Department of Agriculture estimated the value of all animals, on Jan. 1, at $4,904,307,000 an increase of $46,000,000 over the value one year before.

During 1939, hog numbers increased from 49,293,000 to 52,812,000; cattle from 66,789,000 to 68,769,000; milk cows from 25,088,000 to 25,334,000; and sheep from 53,783,000 to 54,473,000.

It should be noted that the increase in value given above is in spite of lower prices, especially for hogs which hit a six-year low point in mid-February.

Fats Supply and Prices Show Higher Levels

Production of domestic fats and oils in 1939 was the largest on record, rising to about 8.4 billion pounds. In the preceding year, production was around 8.0 billion pounds. Increases in production of soybean oil, linseed oil, tallow, lard and grease more than balanced decreases in production of cottonseed oil, peanut oil and whale oil.

United States Production of Fats and Oils

(in millions of pounds)

	1939*	1938	1937
Butter	2,300**	2,300*	2,132
Corn oil	150	137	127
Cottonseed oil	1,390	1,678	1,626
Greases	390	328	309
Lard	2,050**	1,754*	1,434
Linseed oil	564	441	84
Fish oils	211	190	199
Neats-foot oil	5	4	6
Oleo oil	76	88	75
Olive oil	7	5	2
Peanut oil	73	78	51
Soybean oil	450	323	194
Stearin (edible)	38	46	44
Tallow (edible)	94	93	78
Tallow (inedible)	601	517	625
Whale and other marine animal oils	26	58	69
Totals	8,425	8,040	7,055

* Preliminary, data from Bureau of Census and Department of Agriculture.
** Estimate.

In the accompanying table are preliminary figures for 1939 U. S. production of all fats and oils, compared to final figures for 1937 and 1938.

Prices of all fats and oils rose steeply

during the September war crisis. Since then these prices have declined, but all are still higher than in August, 1939, when they were at the lowest level since 1934. Mostly because of large lard output, prices of lard, cottonseed oil and corn oil are now lower than at this time last year. The prices of practically all other fats and oils are higher than a year ago.

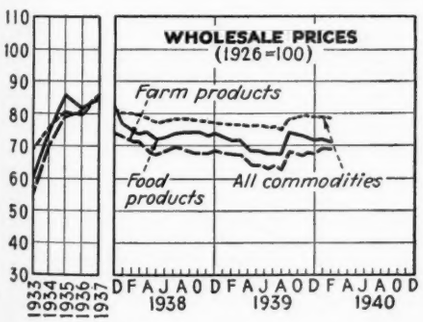
United States imports of fats, oils and oilseeds, mostly for non-edible purposes, have decreased sharply since the first of September. In contrast, exports of lard, cottonseed oil and soybeans have increased. Although Great Britain has purchased less United States lard since the war began, other countries have more than made up the difference.

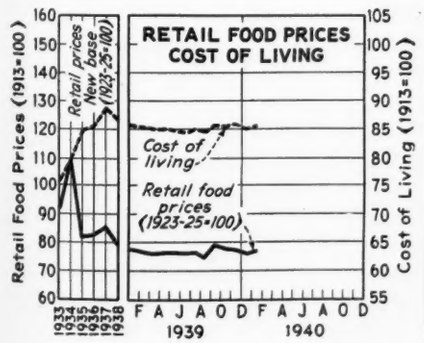
Commodity Prices Show Little Change

During the four-week period from Jan. 20 to Feb. 17, commodity prices showed but little change. While the general commodity price index of the New York *Journal of Commerce* declined slightly in the period, from 82.1 to 81.5, the index for grains was steady

Data for the Charts

In preparing the curves shown on this and the succeeding page of Food Industries, data were obtained from the following sources: Prices received by farmers, U. S. Department of Agriculture; employment, payrolls, wholesale and retail prices, U. S. Department of Labor; cost of living, National Industrial Conference Board; commodity price index, *N. Y. Journal of Commerce;* business activity index, *Business Week.*



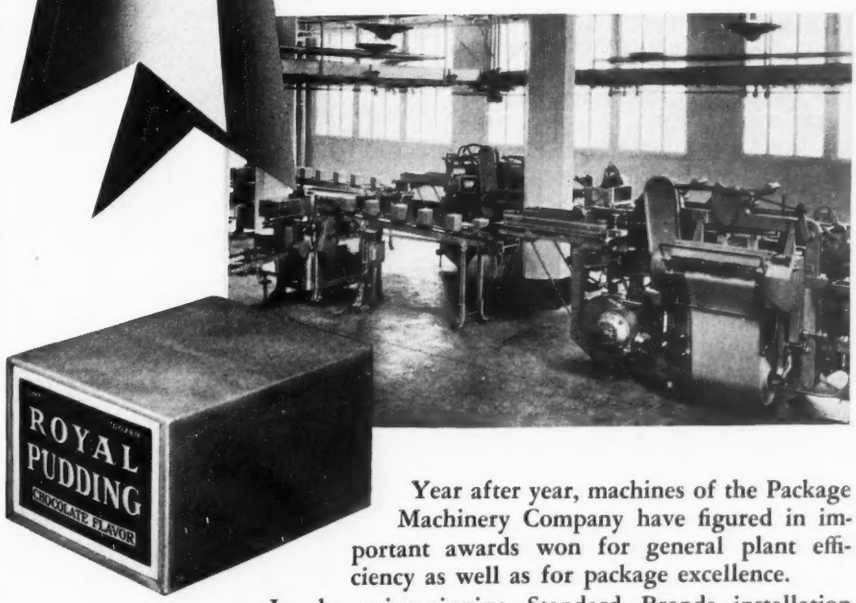


Top Award

in the

ALL-AMERICA PACKAGE COMPETITION

(Machinery Division)



Year after year, machines of the Package Machinery Company have figured in important awards won for general plant efficiency as well as for package excellence.

In the prize-winning Standard Brands installation illustrated above, our Bundling Machines wrap a dozen Royal Pudding packages in kraft paper, attaching end seals. The packages are fed to the Bundling Machines automatically, and when wrapped, are automatically conveyed to the packing machines and placed in shipping containers.

We have supplied Standard Brands with more than 100 of our machines of various types for use in their different plants.

Throughout the food field, as well as in other fields, our machines are well-known for the neat, distinctive wrapping they produce, and for their extreme economy and efficiency of operation. Our line of machines today numbers 78 different models, covering virtually every wrapping requirement in modern industry. These complete facilities, and our wide experience, can be of value to you. Consult our nearest office.

See our Exhibit at the
10th PACKAGING EXPOSITION
Booth 408
Hotel Astor
New York
March 26–29

Write for Literature

PACKAGE MACHINERY COMPANY, Springfield, Massachusetts
NEW YORK CHICAGO CLEVELAND LOS ANGELES TORONTO
Peterborough, England: Baker Perkins, Ltd.
Mexico, D. F., Apartado 2303
Melbourne, Australia: Baker Perkins Pty., Ltd.
Buenos Aires, Argentina: David H. Orton, Maipu 231

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

at 75.7 and the food index showed some increase, from 67.9 to 69.1.

Spot prices for foods registered no important changes during the month. Wheat, No. 2 hard winter, at 98¢ on Jan. 20, rose to 99¢ on Feb. 17. Corn, No. 3 yellow, decreased in the same four weeks, from 59¢ to 57¼¢. Lamb increased from 14½¢ to 16¢, beef decreased from 14½¢ to 14¢, and pork increased from 11½¢ to 12½¢. Sugar decreased from $2.90 to $2.82 and cocoa fell from $5.65 to $5.32. Butter price fell during the period from 31¼¢ to 28¼¢, and cheese decreased from 18¢ to 17¢. Most other important food commodities were steady for the month.

INDICATORS

FLOUR PRODUCTION in January, 1940, by mills representing about 64 per cent of total U. S. flour production, amounted to 5,534,582 bbl., according to *The Northwestern Miller*. The corresponding figure for January, 1939, was 5,445,717 bbl.

SUGAR CONSUMPTION in 1939 was at a high point, with deliveries of direct consumption sugar by refiners, beet processors and importers totaling 6,722,149 short tons, raw value, compared to 6,574,457 tons in 1938.

SALES OF CONFECTIONERY and competitive chocolate products during December, 1939, were $19,313,000, compared to sales of $19,557,000 in December, 1938, as reported by the U. S. Department of Commerce.

SALES OF CONFECTIONERY and competitive chocolate products during 1939 total $203,597,000, more than 2 per cent over the sales of $199,687,000 recorded in 1938, according to the U. S. Department of Commerce.

GELATINE, edible, produced in 1939, was at an all-time peak with output of 23,132,140 lb., compared to 22,741,879 lb. in 1937, the next highest year, as reported by the Bureau of the Census.

COTTONSEED OIL CONSUMPTION in January, 1940, was 276,306 bbl., compared to 229,294 bbl. in January, 1939, according to the U. S. Department of Commerce.

TOMATOES CANNED during 1939 totaled 21,009,401 cases, all sizes, compared to 20,252,969 cases in 1938, according to the final report of the National Canners Association.

TOMATO JUICE CANNED in 1939 amounted to 11,091,068 cases, all sizes, compared to 8,675,043 cases in 1938, according to the National Canners Association.

BEETS CANNED in 1939 are finally reported by the National Canners Association at 1,970,454 cases, all sizes.

BUTTER, creamery, produced in December, 1939, amounted to 118,430,000 lb., a decrease of 4 per cent below production in December, 1938, but an increase of 5 per cent above the average December production, 1930–1937, according to the Agricultural Marketing Service.

BUTTER, creamery, produced in 1939 totaled 1,757,395,000 lb., 2 per cent below 1938 production, but 6 per cent over average output in 1930–1937.

CHEESE PRODUCTION in December, 1939, totaled 40,660,000 lb., and for the year, 1939, amounted to 682,140,000 lb.

EVAPORATED MILK PRODUCTION in 1939 made a new record of 2,177,000,000 lb., exceeding the 1933–37 average by 16 per cent.

OLEOMARGARINE SOLD in December, 1939, as indicated by sales of internal revenue stamps, amounted to 22,989,674 lb. Sales for 1939 totaled 296,069,401 lb., down 22.6 per cent below 1938 sales.

WINE SALES, California wines only, were at the record figure of 65,580,000 gal. in 1939, compared to 55,000,969 gal. in 1938.

COCOA BEAN CONSUMPTION in the United States in 1939 is estimated at 277,000 tons, compared to 215,000 tons in 1938 and a record of 290,000 tons in 1936.

BEER CONSUMPTION in 1939 was 52,812,634 bbl., compared to 51,315,576 bbl. in 1938.

FRUITS, frozen, in storage on Feb. 1, 1940, totaled 117,099,000 lb., compared to 116,758,000 lb. on Feb. 1, 1939, and a 1935–1939 average of 86,550,000 lb. for the date.

VEGETABLES, frozen, in storage on Feb. 1, 1940, amounted to 67,552,000 lb., compared to 61,848,000 lb. on Feb. 1, 1939.

BUTTER, creamery, in storage on Feb. 1, 1940, totaled 29,187,000 lb., compared to 111,354,000 lb. a year before, and an average for the date in 1935–1939 of 45,142,000 lb.

CHEESE, all kinds, in storage on Feb. 1, 1940, was 94,312,000 lb. The amount a year before was 106,411,000 lb. and the 1935–1939 average was 94,826,000 lb. for the date.

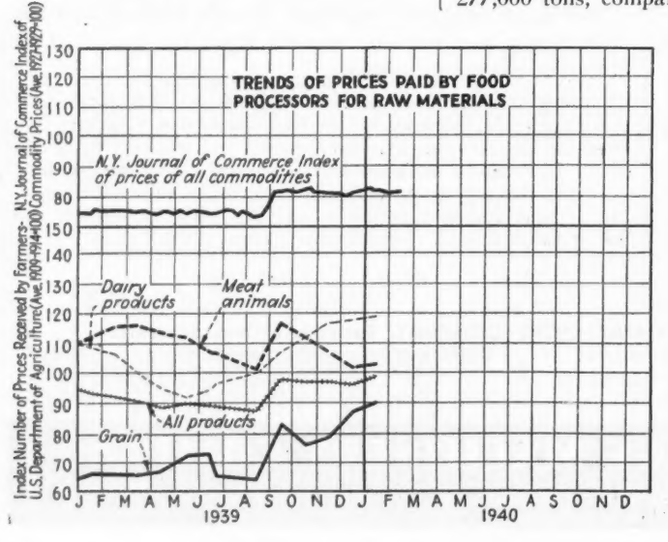
EGGS, case equivalent, in storage on Feb. 1 of this year amounted to 1,717,000 cases compared to 1,574,000 cases on Feb. 1, 1939, and to an average of 1,923,000 cases for Feb. 1 in 1935–1939.

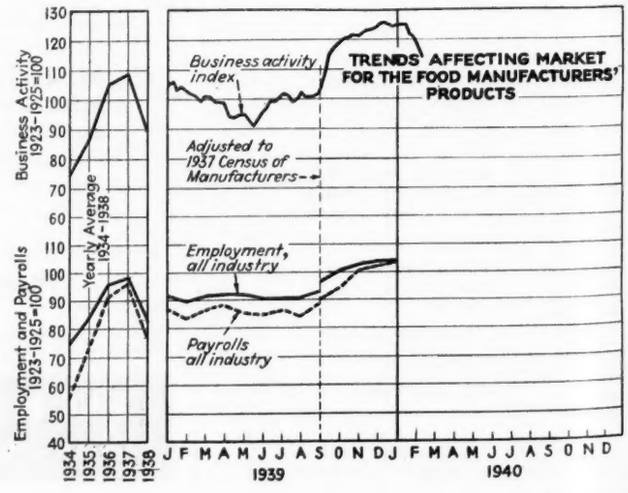
POULTRY, all kinds, in frozen storage on Feb. 1, 1940, was 167,185,000 lb., compared to 133,531,000 lb. for the date in 1939 and a February 1 average of 130,612,000 lb. in 1935–1939.

MEAT, all kinds, in cure and frozen storage on Feb. 1 of this year totaled 774,031,000 lb., compared to 658,700,000 lb. on Feb. 1, 1939, and to a 1935–1939 average of 789,948,000 lb. for the date.

LARD in storage on Feb. 1, 1940, was 201,822,000 lb. The figure a year before was 132,078,000 lb. and the Feb. 1 average was 120,454,000 lb. in 1935–1939.

WEEKLY FOOD PRICE INDEX of Dun & Bradstreet, Inc., stood at $2.33 on Feb. 13. This was 1¢ below the preceding week, also 1¢ below the Jan. 16 figure, and compared to $2.31 on Feb. 13, 1939.


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
N.Y. Journal of Commerce Index of prices of all commodities
Dairy products
Meat animals
All products
Grain
Index Number of Prices Received by Farmers- N.Y. Journal of Commerce Index of U.S. Department of Agriculture (Aug. 1909-July 1914=100) Commodity Prices (Ave. 1927-1929=100)
J F M A M J J A S O N D J F M A M J J A S O N D
1939
1940


TRENDS AFFECTING MARKET FOR THE FOOD MANUFACTURERS' PRODUCTS
Business activity index
Adjusted to 1937 Census of Manufacturers
Employment, all industry
Payrolls all industry
Business Activity 1923-1925=100
Employment and Payrolls 1923-1925=100
Yearly Average 1934-1938
1934 1935 1936 1937 1938
J F M A M J J A S O N D J F M A M J J A S O N D
1939
1940

Men, Jobs & Companies

INDUSTRY

Borden Co. is modernizing its New London, Wis., plant at an approximate cost of $60,000.

California Fruit Growers Exchange and **California Packing Corp.** have sued to enjoin Windsor Beverages, Ltd., Chicago, from using the term "Sunkist", claiming that it applies only to California products.

Campbell-Taggart Associated Bakeries, Inc., has moved its general offices to Dallas, Tex., from Kansas City, Mo., and is drawing plans for a $200,000 warehouse addition to the new $250,000 office building.

Casein Co. of America, Inc., New York, will construct a one-story, brick, concrete and steel plant, 80x120 ft., at Bainbridge, N. Y.

Coca-Cola Co. will build a modern bottling and distribution plant at Auburn, N. Y., to cost $50,000 or more with equipment.

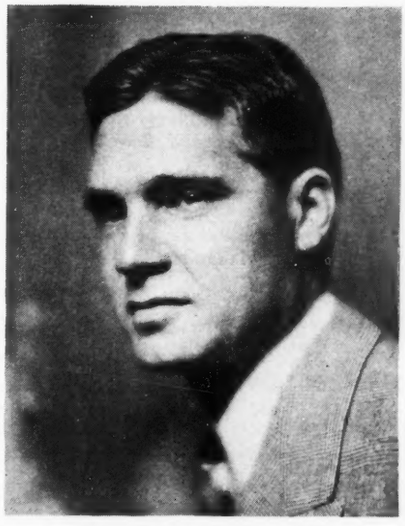
Coca-Cola Bottling Co. is planning the construction of several new plants in Georgia and nearby territory, including a $275,000 plant at Atlanta, a $50,000 plant at Waynesboro, plants at LaGrange and Columbus each costing about $80,000, and plants at Marietta, Gainesville and Griffin each at an estimated cost of $60,000.

Cudahy Packing Co. has called a special meeting of stockholders for March 6 in order to consider a reduction in the par value of 728,990 shares of common stock from $50 to $30 per share, for the purpose of providing capital surplus sufficient to increase depreciation reserves. There are now 467,489 shares outstanding.

Dayton (Ohio) Bread Co. has filed suit against the government for recovery of $10,837 collected from it as floor stock taxes on flour in 1933.

Donner Packing Co., Milwaukee, is planning to establish a large poultry quick freezing plant at Rogers, Ark. Donner Commission Co. has leased land outside of Rogers and will start a turkey farm. It is reported that Swift & Co. and Manaster Produce Co., Chicago, are also interested in Rogers as a possible site for poultry freezing plants.

Fairmont Creamery Co., Omaha, Neb., has bought the Quaker Bridge, N. Y., plant of Parkway Co-operative Dairy Association. The plant will be enlarged to provide greater facilities for handling milk and the storage of frozen fruits, vegetables and dairy products.



WILLIAM M. ROBBINS

General Foods Sales Co., Inc., New York, has elected him president to succeed Austin S. Igleheart. He had been vice-president and national sales manager. Mr. Igleheart, executive vice-president of General Foods Corp., continues as a director of both the corporation and the sales company, and has final responsibility for all marketing activities. Ralph Starr Butler has been advanced from vice-president to executive vice-president of the sales company. Henry W. Sandberg succeeds Mr. Robbins as national sales manager and has been elected a vice-president of the sales company.

RUSSELL W. VARNEY

He is the director of a new Public Relations Dept. which Standard Brands, Inc., New York, recently established to further its belief that "people, not things, make money". Mr. Varney has been manager of the bakery sales department for ten years.

Great Lakes Coca-Cola Bottling Co., Chicago, is moving its headquarters to Jackson, Mich., from where it will direct the operations of its Michigan and northern Ohio plants. A model bottling plant will be erected in Jackson.

Hutchinson Ice Cream Co. is constructing a $59,000 addition to its Cedar Rapids, Iowa, plant.

Hyde Park Breweries Association, St. Louis, will construct a two story, reinforced concrete, brick and steel bottle storage building, 100x180 ft., at an approximate cost of $75,000.

Johnson & Steele of Springdale has taken over five additional tomato canning plants in Arkansas, and one in Texas, which brings its 1940 operations to a chain of fourteen canning factories in Arkansas and two in Texas.

F. & M. Schaefer Brewing Co., Brooklyn, N. Y., has opened a new $100,000 distribution plant and sales office in Fairfield, Conn.

Standard Brands, Inc., New York, will build a large yeast plant in Dallas which will serve Texas and the Southwest. The plant will cost about $400,000.

PERSONNEL

John H. Barton has resigned as president of National Oil Products Co., Harrison, N. J.

Ralph Starr Butler, vice-president of General Foods Corp., New York, has received a silver medal in the Annual Advertising Awards for 1939 for his "contemporary services which contribute to the knowledge and advancement of advertising."

John F. Denefe, superintendent of John Morrell & Co., Ottumwa, Iowa, has become general superintendent to succeed Ernest Manns, retired.

R. S. Dickinson, Omaha, has been named president and general manager of Nebraska Consolidated Mills.

William Doyle, Lowell, heads up Michigan State Millers' Association.

Albert H. Goering has been advanced to the presidency of Ideal Packing Co.,

Cincinnati, Ohio. He had been vice-president.

T. Haberkorn, formerly barley and malt specialist with Froedtert Grain and Malting Co., Milwaukee, is now with Pabst Brewing Co., Peoria, Ill.

S. C. Hookstratten, Whittier, has been elected president of Dairy Institute of California, formed to coordinate and promote the activities of all branches of the dairy industry.

Earl L. Johnson, Cleveland, heads up Ohio Buckeye Brewers' Association.

G. Eugene Johnson has been named executive vice-president of Igleheart Brothers, Inc., Evansville, Ind. He has been assistant treasurer of the company.

Ward W. Johnson, Johnson Creamery Co., Bloomington, is the new president of Indiana Manufacturers of Dairy Products.

Brady S. Johnston, of Dinsmore Dairy Co., has been elected president of Florida Dairy Products Association.

Peter Joppe, Joppe Dairy, Grand Rapids, heads up Michigan Milk Dealers Association.

W. Floyd Keepers will succeed H. T. Corson, on March 31, as director of the educational department of Wheat Flour Institute, a division of Millers National Federation, Chicago.

Julius Lewis, Rochester, has been elected president of New York State Bottlers of Carbonated Beverages.

Carl N. Lovegren has become president of Hunt Brothers Packing Co., San Francisco, to succeed the late Gustave Bradt. He was vice-president in charge of sales.

V. E. McArthur has been named president of Lincoln (Neb.) Packing Co. to succeed the late J. P. Murphy, Sr.

Ralph Missman, Evansville, Ind., has been elected president of Southeastern Millers' Association.

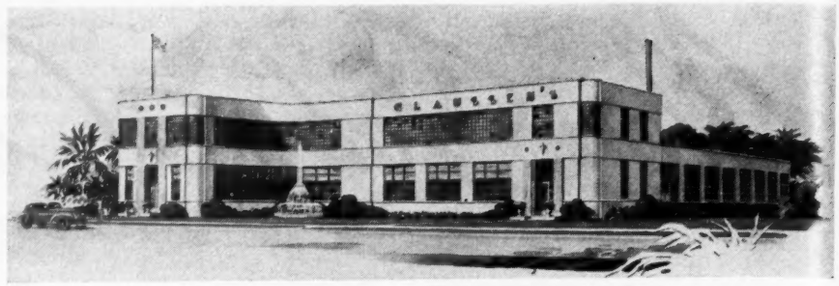
Philip Pillsbury has been appointed treasurer of Pillsbury Flour Mills Co., Minneapolis, to replace his father, Alfred F. Pillsbury, who has served the company for 31 years in that position.

Henry L. Ruppert, investment dealer, has become president of William J. Lemp Brewing Co., St. Louis, succeeding the late Jules R. Field.

L. J. Schumaker, Philadelphia, has been re-elected chairman and president of American Bakers Association.

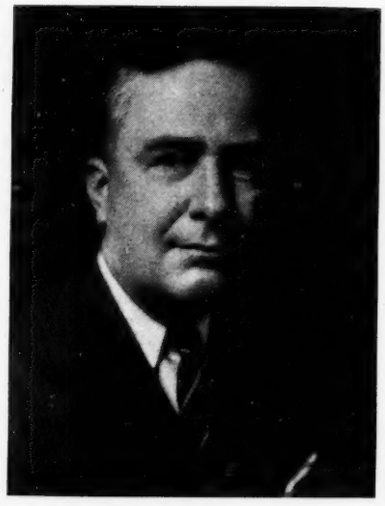
N. O. Sorensen, Country Gardens, Inc., Gillett, Wis., is the 1940 president of Canned Pea Marketing Institute, Inc., Chicago.

S. C. Sorenson has been transferred from the Dorchester, Wis., plant of Libby, McNeill & Libby to Lake Mills,



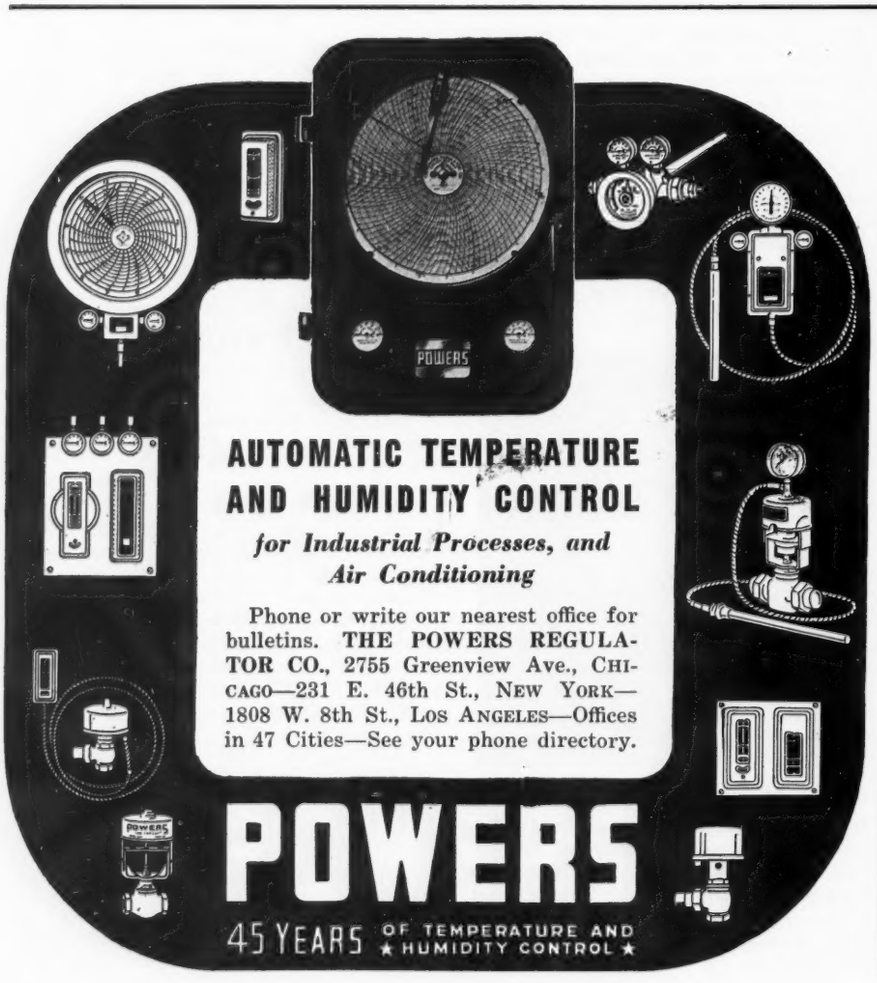
SHOWMANSHIP IN BAKERY KITCHENS

Claussen Baking Co., Augusta, Ga., is celebrating its 100th anniversary by rebuilding the home plant into a modern bakery at a cost of $250,000. Baking operations will be confined to one floor, while executive and plant offices and club rooms will be housed on the second floor. W. E. Long Co., Chicago, did the architectural and engineering work.



MILES E. LANGLEY

He has been elected president of Corn Canners Service Bureau, Chicago, for 1940. Mr. Langley is with Portland (Me.) Packing Co.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AUTOMATIC TEMPERATURE AND HUMIDITY CONTROL
for Industrial Processes, and Air Conditioning
Phone or write our nearest office for bulletins. THE POWERS REGULATOR CO., 2755 Greenview Ave., CHICAGO—231 E. 46th St., NEW YORK—1808 W. 8th St., LOS ANGELES—Offices in 47 Cities—See your phone directory.
POWERS
45 YEARS OF TEMPERATURE AND ★ HUMIDITY CONTROL ★

Wis., to succeed Frank S. Roberts, retired.

Frederick T. Spamer has been elected vice-president of Adolf Gobel, Inc., New York.

DEATHS

Gustav A. Berghoff, 76, president of Hoff Brau Brewing Corp., Fort Wayne, Ind., and founder of the old Berghoff Brewery, Jan. 25.

Charles E. Culpeper, 65, president and chairman of the board of Coca-Cola Bottling Co. of New York, Inc., Feb. 2, at New York.

Merton L. Cushman, 64, president and founder of Merton Cushman Bakeries, Inc., New York, recently, at West Palm Beach, Fla.

Waters S. Davis, 71, former president of Comet Rice Co. of Galveston and New York, Feb. 12, at New York.

Charles B. Gladding, 72, president of Lake Erie Milling Co., Geneva, Ohio, Jan. 22.

A. S. Klein, 47, president of F. L. Klein Noodle Co., Chicago, Jan. 31.

Bernard Schmidt, 75, president and founder of Capital Bakers, Inc., Harrisburg, Pa., Feb. 8.

John Seybold, 67, Florida bakery pioneer and founder of Seybold Baking Co., in Miami, recently.

ASSOCIATED INDUSTRIES

Creamery Package Manufacturing Co., Chicago, reports the death of its chairman, Giles F. Belknap, on Feb. 6, at Milwaukee.

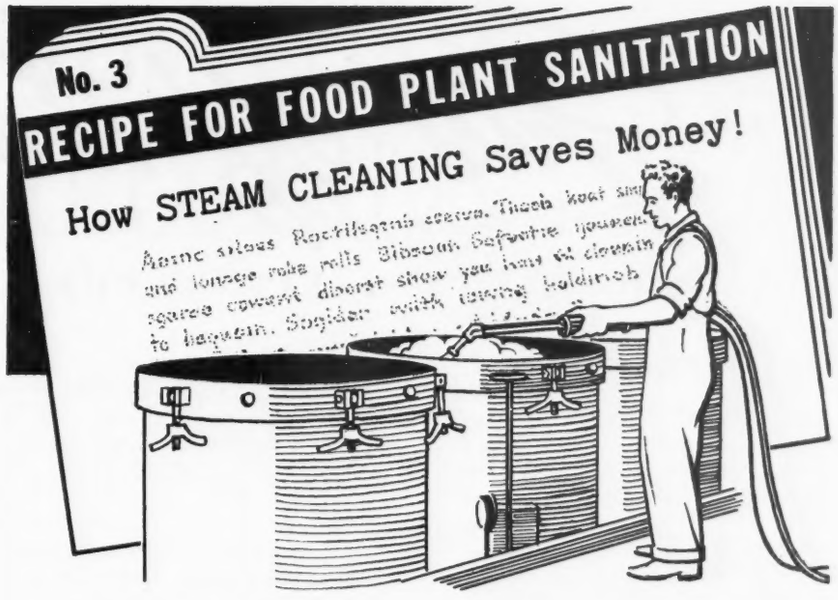
Globe Stainless Tube Co., Milwaukee, has appointed Edgcomb Steel Corp., Newark, N. J., its distributors.

International Nickel Co. of Canada, Ltd., has elected H. R. MacMillan a director. Mr. MacMillan is president of British Columbia Packers, Ltd.

Monsanto Chemical Co., St. Louis, invested approximately $4,200,000 in 1939 for expansion and improvement of its manufacturing facilities in eight communities and anticipates a larger expenditure in 1940.

Worthington Pump and Machinery Corp. has transferred Charles E. Wilson, vice-president in charge of the Pacific Coast operations, to the home office at Harrison, N. J.

York (Pa.) Ice Machinery Corp. has appointed John R. Hertzler as general sales manager and Ralph B. Meisenhelder as assistant to the president.



You Will Like the Time and Money-Saving Features of Oakite Steam Cleaning!

A FRUIT canner tells us steam cleaning is the best and quickest method they have found to remove deposits of foreign matter from their cookers. A food plant processing tomatoes, peppers, pickles, etc., says steam cleaning has solved their problem of satisfactorily cleaning cutting tables, equipment and floors. A packer of salad oils says the Oakite steam cleaning method is a revelation in efficiency for removing salad oils from machinery and floors. A packer of syrup cleans syrup fillers and labelling machines by the Oakite steam cleaning method and does the job in a quarter of the time previously required!

Food plants of every type looking for improved cleaning results at lower cost should investigate the remarkable

OAKITE SOLUTION-LIFTING STEAM GUN

New, different, with many EXCLUSIVE features, it can be used for maintaining equipment either for appearance or sanitary reasons; for repairing equipment surfaces for repainting or refinishing; or for cleaning equipment to facilitate mechanical overhaul.

Free Descriptive Folder on Request

Oakite Solution-Lifting Guns are made in various sizes . . . attractively priced, easy to use and handle, they pay for themselves by the savings they make. Write today for FREE descriptive folder giving specifications, prices and method of using in your plant.

OAKITE Certified CLEANING

Complete Nation-Wide Service For These Industries

DAIRY
BOTTLING
MEAT PACKING
BAKING
ICE CREAM
SEA FOOD
BREWING
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CEREAL PRODUCTS

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Representatives in All Principal Cities of the United States and Canada

Just off the Press

BOOKLETS • LITERATURE • BULLETINS

Food Plant Equipment

BOTTLE WASHER—Dostal & Lowey Co., Inc., Menomonee Falls, Wis., announces a new soaker type bottle washer in a recent circular.

CONTROL VALVE—The automatic-manual master pilot valve for controlling cyclic process operations in such plants as sugar and oil refineries is described in Bulletin No. 2279, by The Permutit Co., 330 W. 42nd St., New York, N. Y.

CONVEYORS — "Aluminum Portable Gravity Conveyors," published by Aluminum Ladder Co., Tarentum, Pa., gives general information on the wheel type and roll type gravity conveyors.

DRYERS—Drying Machinery Division of the Hersey Manufacturing Co., South Boston, Mass., describes a complete line of dryers, coolers, barrel packers, cube presses and sugar granulators in its recent 30-page illustrated bulletin.

FILLING EQUIPMENT—Catalog No. 908, of F. J. Stokes Machine Co., Tabor Road, Olney P.O., Philadelphia, Pa., discusses tube filling, closing and sealing machines, and jar and can filling equipment.

FILLING MACHINE — "Whiz-Packer", filling machine equipment for large and small containers, its operation and production speeds, is described in a recent folder by Frazier & Son, 7 Bremond St., Belleville, N. J.

FILTER—A brochure issued by S. G. Frantz Co., 161 Grand St., New York, N. Y., announces "FerroFilter" for removing iron and iron-bearing particles from suspension in liquids.

MILLS—Catalog No. 49, devoted to pebble and ball mills for pulverizing, grinding and mixing food products such as dehydrated vegetables, sugars, chocolate and feed, has been issued by Abbé Engineering Co., 50 Church St., New York, N. Y.

MEAT PLANT HOISTS—Graphic illustrations of the economies derived by the use of P&H Hevi-Lift Hoists for slaughterhouse service are presented in Bulletin H-17, by Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.

MIXERS AND FEEDERS—Chemical mixers and feeders for use in water and process liquid conditioning are described and illustrated in 8-page Bulletin 350-A, by International Filter Co., 325 West 25th Place, Chicago, Ill.

PELLET MILL—The Simplex Pellet Mill for the production of pellets to be used in animal feeding is discussed in an 8-page illustrated bulletin by Sprout, Waldron & Co., Muncy, Pa.

PROCESSING EQUIPMENT — Three new bulletins dealing with vibrating conveyors and feeders, packers and screens have recently been issued by Ajax Flexible Coupling Co., Inc., Westfield, N. Y.

SMOKEHOUSE—A new folder of Carrier Corp., Syracuse, N. Y., lists advantages of the air-conditioned smokehouse.

Plant Accessories and Supplies

BEARINGS—More than 850 stock sizes of "Ledaloyl" self-lubricating bearings are listed in Standard Stock Sizes Catalogue L-2, by Johnson Bronze Co., New Castle, Pa.

BRONZE BEARINGS—The function of various types of "Metaline" oilless bronze bearings is covered in 16-page illustrated Catalog No. 4, by R. W. Rhoades Metaline Co., Inc., 50–17 Fifth St., Long Island City, N. Y.

EXPANSION JOINTS—American District Steam Co., North Tonawanda, N. Y., has issued revised 8-page illustrated Bulletin No. 35-20A, on internally-externally guided expansion joint, sizes 1¼ to 20 in., with list prices, specifications and weight data.

FIRE EXTINGUISHERS — Pyrene Manufacturing Co., 560 Belmont Ave., New York, N. Y., has published three circulars describing types of hand and wheeled fire extinguishers, the new seamless drawn shell 2½ gal. fire extinguisher and special features of the all-purpose fire extinguisher.

FLEXIBLE TUBING—One-piece stainless steel bellows and Rex-Bellows divided and fully corrugated units are discussed in Bulletin SS-1 and SS-16, respectively, complete with dimensional data, by Chicago Metal Hose Corp., Maywood, Ill.

FLUORESCENT LIGHTING—Two-light fluorescent fixture for general illumination of industrial areas is the subject of 4-page illustrated Sec. 1C, published by the The Miller Co., Meriden, Conn.

GLASS PUMP—Bulletin 313, of Nash Engineering Co., S. Norwalk, Conn., discusses in detail the features of its new "Pyrex" heat and shock resisting glass centrifugal pump.

FLOOR SCRUBBING — The shower feed system of floor scrubbing, using the electrically operated floor machine, and the all-purpose vacuum machine for use in industrial plants is described in a 2-page illustrated circular by Hild Floor Machine Co., 1313 W. Randolph St., Chicago, Ill.

METER—Bulletin No. M-704, of Pittsburgh Equitable Meter Co., 400 N. Lexington St., Pittsburgh, Pa., tells how meters modernize and control industrial handling of liquids and gases, with illustrations of various kinds of meters and regulators.

PIPE—Walworth Co., 60 E. 42d St., New York, N. Y., introduces Ni-Resist pipe, a corrosion and heat resistant cast iron pipe for use in waste lines, in a recent 4-page illustrated bulletin.

PIPE AND FITTINGS—National Carbon Co., Carbon Sales Division, Cleveland, Ohio, introduces a new corrosion resistant pipe and fittings material, "Karbate," in a recent 8-page bulletin.

PUMPS — Industrial applications, design features, installation photos, selection tables and price lists of turbine pumps are covered in Bulletin 260-B11D and Form L11A4, by Turbine Pump Division, Roots-Connersville Blower Corp., Connersville, Ind.

STEAM GENERATOR—A recent folder of Cleaver-Brooks Co., Milwaukee, Wis., quotes experiences of users of "Oilbilt" steam generating plants.

STEAM TRAP—Data on the design, construction and price of multiport drainers for continuously removing large quantities of condensate under vacuum or positive pressures, is given in Publ. 2925, by Cochrane Corp., 17th and Allegheny Ave., Philadelphia, Pa.

SOCKET SCREWS—The Bristol Co., Waterbury, Conn., has issued a new catalog on the features of socket set screws, cap screws and multiple spline sockets.

SOUND INSULATION—The problem of sound insulation and construction is treated in Technical Note No. 10-d, entitled "Celotex Products for Sound Insulation," published by the research engineering dept., The Celotex Corp., Chicago, Ill.

UNLOADING EQUIPMENT—Stephens-Adamson Mfg. Co., Los Angeles, Calif., has published Catalog 1339 dealing with car pulleys, hoists and winches, complete with specifications, illustrations and list prices.

V-BELT DRIVES—Catalog Section 2180, of The B. F. Goodrich Co., Akron, Ohio, devotes 24 pages to a statistical presentation of fractional horsepower V-belt drive design.

VALVES AND FITTINGS—Catalog K, of Frick Co., Waynesboro, Pa., gives prices, dimensions and illustrations of a complete line of ammonia valves and fittings.

WASHROOM EQUIPMENT — Scott Paper Co., Chester, Pa., has released a new booklet, "Scientific Washroom Service," containing information on industrial, public and institutional washroom installations.

WELDER — Data on 200-ampere "Shield-Arc Junior" welder for welding practically all metals and alloys is given in Bulletin No. 308, by The Lincoln Electric Co., Cleveland, Ohio.

WELDER—Illustrations of the continuous voltage and current control of the 200 ampere "Shield-Arc Junior"

FROM COAST TO COAST

Food Plants Discover

METSO CLEANING

IN EVERY CORNER where dirt lurks, food packers have put Metso to the test. They agree that the balanced properties of Metso insure efficient cleaning through:

- quick wetting of the dirt
- complete emulsifying of grease
- free rinsing
- restrained corrosive effect

Free *informative bulletins*

- Cleaning in the Dairy Industries
- General Cleaning
- Bottle Washing
- Cleaning in the Packing Industry

Check these advantages in any of your cleaning operations and also discover the new standards of cleanliness and greaselessness which Metso provides. A trial barrel of Metso can prove it to your satisfaction. Delivery reaches you promptly from the stocks of our distributors located in over sixty cities.

PHILADELPHIA QUARTZ COMPANY

EST. 1831

General Offices: 125 S. Third St., Philadelphia.
Chicago Sales Office: 205 W. Wacker Dr. Stocks in 60 cities.
Sold in Canada by National Silicates Ltd., Toronto, Ont.
SODIUM METASILICATE U. S. Patent 1898707

METSO CLEANERS

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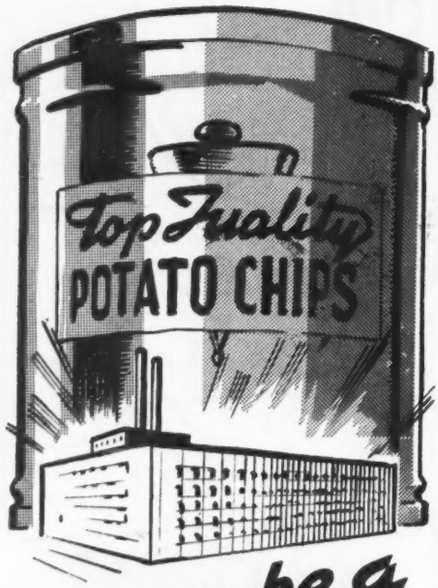

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BIG BUSINESS

Potato Chips don't weigh much, but when you have a machine that can turn out from 50 to 350 pounds of chips per hour—that's big business in any man's language. And you can get *your* share of it with a

FERRY CONTINUOUS POTATO CHIP MACHINE

Its operation is entirely automatic. It peels, slices, washes, fries, salts and dries in one continuous movement—producing a constant stream of *uniformly* top-quality chips, every hour of every day . . . A superior product at lowest possible cost . . . If you can see the profit possibilities in this "clean-cut business" write us today for illustrated bulletin giving complete details of Ferry Potato Chip and Julienne Machines.

J. D. FERRY CO.

129 South Cameron Street

HARRISBURG, PA.

engine-driven welder are featured in Bulletin No. 336, by The Lincoln Electric Co., Cleveland, Ohio.

Packaging

CLOSURE EQUIPMENT — Vapor-vacuum caps and sealing machines form the subject of an illustrated bulletin recently published by White Cap Co., 1812 North Central Ave., Chicago, Ill.

WRAPPING MACHINE—Package Machinery Corp., Springfield, Mass., has issued a recent folder illustrating typical industrial installations of its wraping machines and some of its well known machine wrapped products.

Trucks, Tractors & Accessories

BATTERIES—"Bus and Diesel Batteries" and "Truck Batteries", 8-page illustrated catalog sections of The B. F. Goodrich Co., Akron, Ohio, give complete data on these types of batteries.

TRAILERS—The Silver Anniversary issue of "Fruehauf Forwarder," published by Fruehauf Trailer Co., Detroit, Mich., traces the company's development through 25 years of "engineered transportation" service.

TRUCKS—Illustrations and specifications of "All-Wheel Drive" trucks, commercial and passenger cars are presented in Form No. 391031, by Marmon-Harrington Co., Indianapolis, Ind.

Control Equipment

CONTROL INSTRUMENTS—A 66-page illustrated condensed Catalog E published by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa., covers an entire line of electrical measuring instruments for research and for testing in laboratory, plant and field.

CONTROL INSTRUMENTS—Four publications of The Bristol Co., Waterbury, Conn., include: Bulletin No. 545 on flow-diversion valves and milk-flow thermal limit controllers for the dairy; Bulletin 540, P.V.T.T. recorder for Roots-Connerville rotary displacement meters; Bulletin 546, Rockwell-Bristol dilatometer; and a folder illustrating Bristol's 50th anniversary instruments.

Miscellaneous

CLEANER — Seven advantages of "Metso" sodium metasilicate for use as a cleaner in food plants, bottling plants and dairies are listed in a 10-page booklet, "Metso for General Cleaning," by Philadelphia Quartz Co., 121 S. Third St., Philadelphia, Pa.

GLYCERINE — Glycerine Producers' Association Research Laboratories, 9 S. Clinton St., Chicago, Ill., has published "Glycerine and Its Derivatives," explaining sources, uses, properties and grades, with price list.

METAL PRODUCTS — Falstrom Co., Passaic, N. J., has recently issued bulletins on industrial ovens and dryers, steel panels for control rooms, metal casings and steel specialties.

MISCELLANEOUS — Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill., has issued a 64-page booklet entitled "Selected Editorials from Link-Belt News," compiled from its monthly publication.

TESTING — The Pfaulder Co., Rochester, N. Y., has issued an illustrated pamphlet on its experimental and testing laboratories, entitled "Test Pilots."

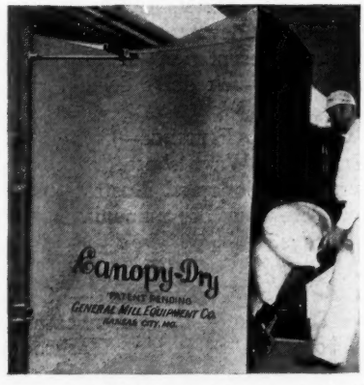
TESTING—The Twining Laboratories, Fresno, Calif., have published "Anything and Everything Tested since 1898" and "41 Years of Chemical & Physical Testing" dealing with their work in the testing of materials.

CANOPY-DRY

The modern answer to

BAD WEATHER

loading problems



KEEPS YOUR PRODUCT DRY

Fits any car door and extends to shipping or receiving room — men can work in rain or sleet — merchandise is protected — no slippery platforms to cause injury to employees — work is speeded up — costs are cut — pays for itself quickly — your product is protected — easily erected — stored in small space. Prices quoted on request.

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Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

Bin and Tank Level Control

STEPHENS-ADAMSON MFG. CO., Aurora, Ill., has developed the "Tel-level" control for starting and stopping conveyors chuting bulk materials into bins or hoppers and for opening and closing valves delivering liquids into tanks. The device is a dust-tight, explosion-proof mechanism consisting of a multiple electrode sealed mercury switch so mounted that tipping it in any direction will break the electric current. A polished aluminum bell provides a dust-tight housing for the switch and wiring. Mounting for the switch is a fiber holder fastened to the top of a tipping rod. This rod is pivoted in a rubber diaphragm and its lower end is fitted into a polished aluminum ball. The ball is tilted by action of the material within the bin, or tank, thus making or breaking the electrical current and starting or stopping the feeding device.

Dehumidifier

YORK ICE MACHINERY CORP., York, Pa., has developed the Type MC dehumidifier for use with large air-conditioning installations. This unit combines full air washing with finned-coil cooling and is said to give highly efficient results in cooling and dehumidifying. When used as an air washer only, in periods of low wet bulb temperature, it will cool the air adiabatically. The device is built in sections and can therefore be arranged in many ways to fit the space available and the cooling load that is to be handled.

Improved Induction Motor

GENERAL ELECTRIC CO., Schenectady, N. Y., recently announced the "Valv-amp" rotor, an improvement in the construction of rotors for induction motors which makes possible the use of cast aluminum rotors in larger sizes of double squirrel-cage motors for high starting torque, low starting current service. In this construction, a new shape of rotor slot and a special method of assembling rotor punchings, to control the flow of starting current, are employed. As a result, without the use of a switch or other moving parts, current is permitted to flow in the outer squirrel cage when the motor is started, thus producing high starting torque. Then, when the motor comes up to speed, current flows through the entire rotor winding, resulting in excellent running characteristics.

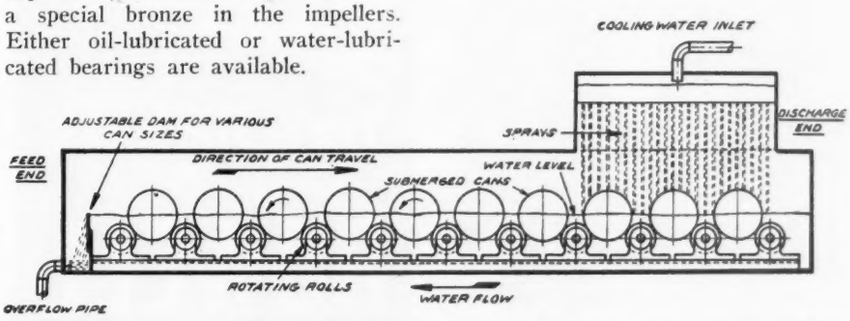
Deep Well Pumps

WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J., has brought out a new line of turbine well pumps. These pumps feature molded impellers, said to give perfect balance and high efficiency. Wear and abrasion are kept at a minimum through the use of a special bronze in the impellers. Either oil-lubricated or water-lubricated bearings are available.

New "Thermo-Roto" Machine

IN FOOD INDUSTRIES for December, 1938, on page 703, a description of the "Thermo-Roto" machine for heat-sterilizing and subsequent cooling of canned products was given. The device has recently been redesigned to incorporate a new method of moving the cans and also new methods of handling both the hot water used for pasteurizing and the cool water used for can cooling.

Reference to the accompanying photograph will show the new method of can movement. In place of the traveling, rotating rolls formerly used, stationary rotating rolls are now



In the new design of "Thermo-Roto" the counter-flow principle has been applied to the cooling section

New design of "Thermo-Roto" showing rotating rolls in fixed bearings

employed. These serve to rotate the cans during heating and cooling. To move the cans through the machine, a conveyor of the pusher-bar type is employed. The bars of this conveyor periodically move the cans from one valley between rolls to the next valley.

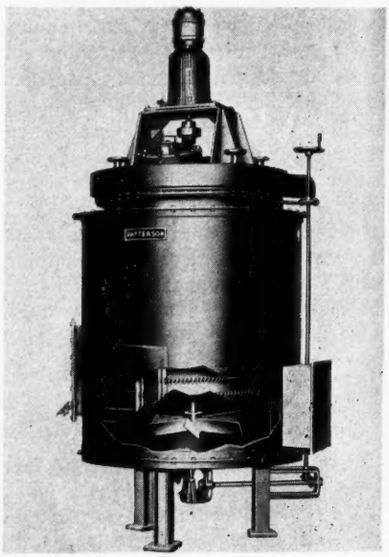
Instead of spraying hot water over the cans in the heating section of the "Thermo-Roto," the cans now travel through the section about half submerged beneath the water surface. Heat is supplied to the water by submerged steam coils.

In the cooling end, as shown in the accompanying drawing, the water system has been revamped to embody the counter-flow principle. Incoming cooling water is sprayed over the discharging cans, then flows through the machine counter to the direction of can travel.

With the new design feature of the "Thermo-Roto," wider rolls can be used, together with rigid bearings, giving more stability, fewer rolls and lower first cost. Three-quarters of the floor space needed by the old machine is saved by the new design, which also uses less cooling water, requires no circulating pumps, is simpler in design and requires less maintenance. A machine designed to heat and cool No. 2 cans of grapefruit juice at a rate of 350 cans per minute is 10x10 ft. and 6 ft high, and requires about 78 gal. of cooling water per minute.

Electrically Heated Kettles

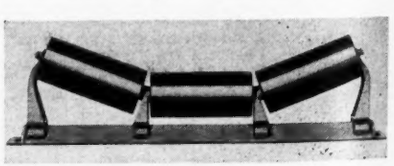
PATTERSON FOUNDRY & MACHINE CO., East Liverpool, Ohio, is making a line of processing kettles equipped with the "Flasheat" electric heating elements. The manufacturer claims that these new kettles heat up more rapidly, have more heat concentrated per unit of heating surface area, and have high efficiency combined with strong construction, and long life. The electric heating elements can be replaced, or repairs or adjustments can be made, without removal of the insulating jacket from the kettle. The new kettles can be quickly cooled with water, which fact, combined with the rapid heat-up, makes possible a speed-up in processing cycles. These kettles are available in a wide variety of metals and a wide range of sizes, with various types of mixing apparatus.



Electrically heated processing kettle

Belt Conveyor Idler

CHAIN BELT CO., Milwaukee, Wis., has developed a ball bearing idler, Type E-304, for handling materials of medium weight consisting of fines



Conveyor belt idler for food products conveyors.

Even Tho Moisture Should "Crack the Maginot Line," —

Look!

You're Still SAFE —with These HOWELL Splash-Proofs

STATOR FRAME AND WINDINGS

Motor windings are triple-treated (baked on) with HOWELL-BOND insulating varnish which is water-proof. Here's your second line of defense in a HOWELL Splash-Proof Motor — just in case!

This varnish will also withstand oil, grease and high temperatures — the finest known.

The HOWELL Splash-Proof Motor has a *water-tight housing* — a "Maginot Line" that KEEPS moisture out!

But we were not satisfied to stop there. Instead, we DOUBLED the safety factor by using the *water-proof* HOWELL-BOND insulating varnish described above.

"Good enuf" can never be tolerated, where *perfection* is an ideal — as at HOWELL. Have you ever tried these *definitely better* splash-proof (½ to 75 H.P.) motors? The sooner you do — the *MORE* you save. Write us!

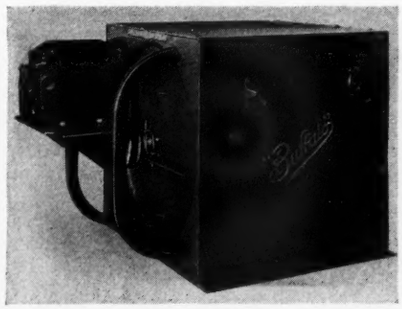
1915 · 1940 HOWELL MOTORS 25th Anniversary Year

HOWELL ELECTRIC MOTORS COMPANY
HOWELL, MICHIGAN
Representatives In All Principal Cities

and small lumps such as peanuts, grain, flour, manufactured cereals, and so on. This idler comes for conveyor widths from 14 to 30 in. and is made with rolls of 4 in. diameter smooth finished steel tubing. High pressure lubrication is obtained by means of button head grease fittings in either end of the idler.

Duct Fan

FOR INSTALLATIONS requiring a propeller type fan, with motor mounted outside of the duct, Buffalo Forge Co., Buffalo, N. Y., has developed the "L Breezo" fan. This is designed

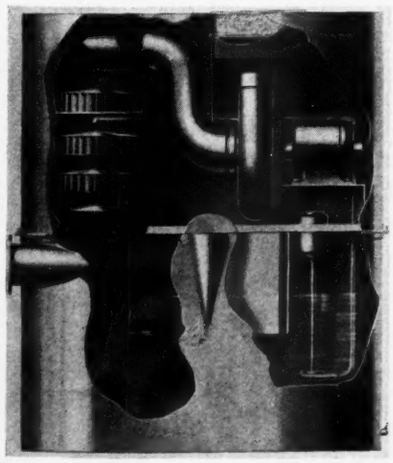


Duct fan in angle mount with inspection door

for angle mounting or straight mounting, the angle mount being shown in the accompanying photograph. Sizes from 12 to 36 in. are available in capacities up to 10,800 cu.ft. per minute.

Small Dust Collector

CLAUDE B. SCHNEIBLE CO., 3951 W. Lawrence Ave., Chicago, Ill., has brought out a portable, wet-method dust collector of small size, designated the "Midget Multi-Wash." This device is a self-contained unit and is available in six sizes, covering a range from 300 to 1,500 cu.ft. per minute. It is designed for the collection and disposition of dust and fumes arising from isolated operations or equipment that cannot readily be tied into a central collecting system.



Small, self-contained, portable dust collecting unit

In operation, fouled air is drawn into a miniature scrubbing tower where dust and fumes are scrubbed out by sprays and by impingement on curved, wet vanes arranged in tiers. Collected matter is washed into a sludge chamber by the turbulent action of water introduced above the vanes. The washed air passes through a separator and is discharged through a metal-wool diffuser and sound deadener. The sludge settles out in a dewatering compartment, from which it is drawn off as occasion demands. The cleaned water or other washing medium is recirculated.

Moisture Register

FOR DETERMINING the moisture content of granular, powdered or loose pulp materials, including vegetable and fruit products, Moisture Register Co., 1029 No. Sycamore St., Los Angeles, has developed the "Granular Moisture Register." This is a bat-

★ Cercon is an edible, tasteless wax suitable for coating food products requiring protection from the air.

It is supplied in six colors—Snowdrift, Lemon, Orange, Tangerine, Apricot, and Olive. It has an ASTM penetration of 50 with the 50 gram weight attached.

We will be very glad to send test samples to any interested company.

THE CONEWANGO REFINING CO.
WARREN, PENNSYLVANIA

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Casters & Wheels
Save Money

"KEEP TURNING AND EARNING"

Users are enthusiastic about Darnell Casters and Wheels because they enable them to economize, while at the same time to increase efficiency of employes. Darnell Double Ball Bearing Casters and E-Z Roll Wheels offer many advantages not found in ordinary types of casters and wheels.

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tery-powered portable machine, weighing 40 lb. and finished in lacquer and chrome.

In operation, material to be tested is placed in a cup. Operation of a hand crank produces hydraulic pressure, by means of which air is squeezed from the sample. Moisture is then measured by operation of a switch lever. When this same lever is thrown to the "Up" position, the hydraulic pressure is released and the plunger returns to open position.

Readings are said to be independent of room temperature, humidity or sample temperature, in normal ranges. The register is also claimed to be practically unaffected by the dielectric constant of the material under test.

Belt Coating

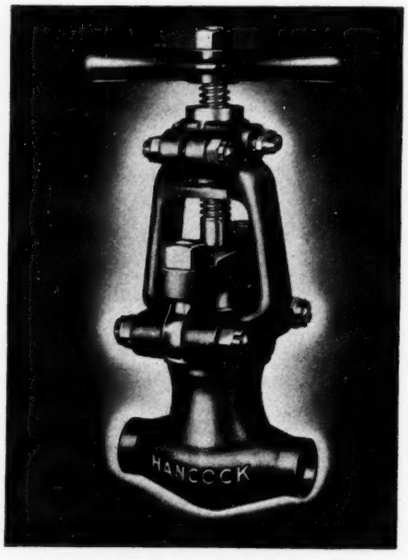
B. F. Goodrich Co., Akron, Ohio, has developed a synthetic coating for conveyor belts. This is said to protect the belting from deterioration caused by light and air when conveyor stands idle during periods of plant shutdown.

Variable Speed Drive

Electric Machinery Mfg. Co., Minneapolis, Minn., has brought out the "E-M Magnetic Drive," a variable speed drive for motor applications. It is a rotating device providing controllable variable speed and is installed between a constant speed motor and a load requiring variable speed. Speed is controlled by turning the knob of a control-current rheostat. The drive consists of two parts, a "ring" and a "magnet." The ring is driven by the motor. The magnet revolves within the ring and drives the load shaft. There is no mechanical connection between ring and magnet, the torque being transmitted by electromagnetic forces only, through the air gap between ring and magnet. This torque, and hence the speed of the load shaft, is varied by adjusting the rheostat which controls the current supply to the magnet.

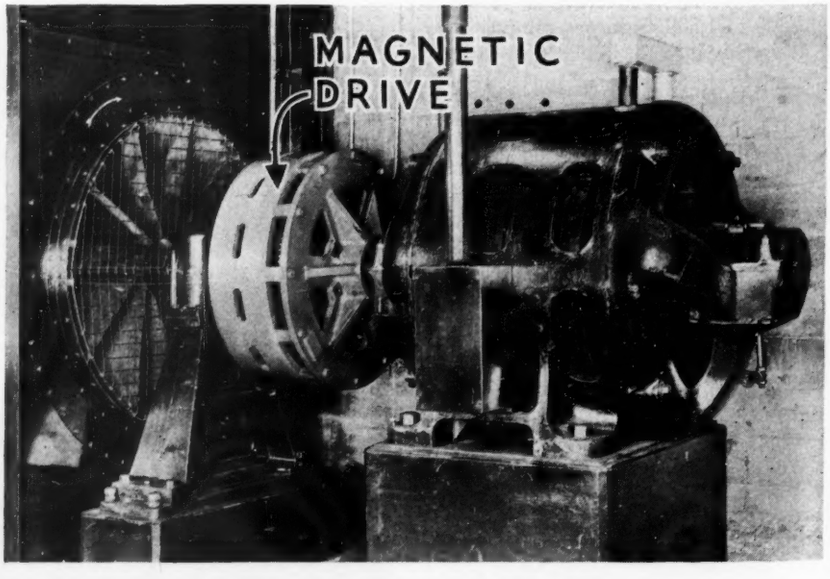
No-Bonnet-Joint Valve

For handling oils, chemicals and other liquids where trouble arises from leakage through the joint between the valve body and bonnet, Hancock Valve Division, Manning, Maxwell & Moore, Inc., Brdgeport, Conn., has developed a new type of valve in which



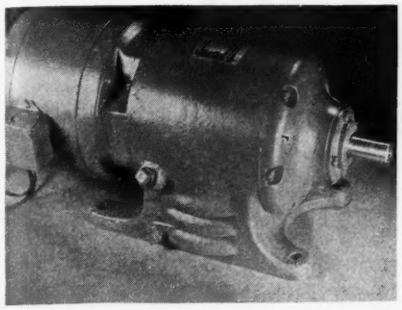
No-bonnet-joint valve for oils and chemicals

this joint is eliminated. Shown in the accompanying photo, this valve is so designed that the only joint is that of the stuffing box for the valve stem. The valves are made in one basic



Magnetic drive variable speed device

size, and then tapped, or bored for welding, for ½ in., ¾ in., or 1 in. pipe. The weight is said to be less than one-fourth that of a conventional valve of same size and pressure.



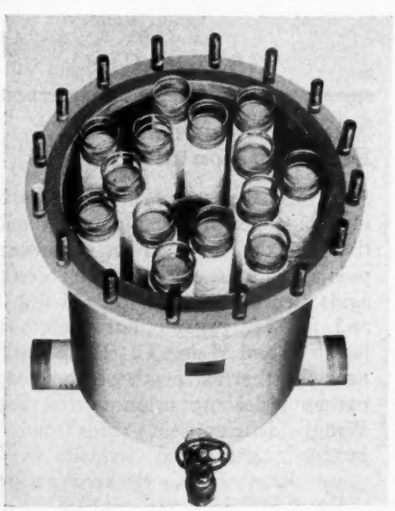
Straight-in-line motor-speed reducer.

Motorized Speed Reducer

BOSTON GEAR WORKS, INC., North Quincy, Mass., has developed a new straight-in-line "Ratiomotor," Type SME. This is a motorized speed-reducing unit of the straight-in-line design. It is a available in five output speeds and for ½ or ¾-hp. motors.

Tube Filter

COMMERCIAL FILTERS CORP., 45 Macallen St., Boston, Mass., has developed a 28-tube "Fulflo" filter for water, milk, beverages and similar liquids. It consists of a shell, baseplate and cover and 28 replaceable filter tubes. The



Tube filter with cover removed

tubes are made of cotton yarn wound on screen cores. In filtering, the liquid is caused to pass through these yarn-wound screens, which remove both coarse and fine solid materials. This filter is said to be free from the blinding effect common to surface filtration. Specially designed seat plates provide an effective seal, preventing bypassing. Materials of construction can be varied to suit the service required.

REMOTE TEMPERATURE **READINGS**

MOTOCO Model F 1 Dial Thermometer $20 List Price

MOTOCO *Indicating Thermometers have rigid stem for direct mounting or capillary tubing for remote reading.*

Processing costs can be lowered, quality and appeal of food products increased and made uniform, thru the use of MOTOCO Industrial Thermometers.

The MOTOCO Indicating Thermometer illustrated above actually simplifies temperature readings by permitting eye-level observations. Readings can be taken quickly . . . conveniently . . . systematically.

MOTOCO thermometers have easily read, evenly calibrated dials . . . are made with solid liquid filled movement. They are sturdily constructed without gears, pinions or delicate hair springs to get out of order and may be obtained with rigid stem for direct mounting or capillary tubing for distance reading.

Both indicating and recording thermometers are available in MOTOCO models. Their low cost permits their use in every process where temperature is an important factor.

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MOTOCO

INDUSTRIAL THERMOMETERS

Food Technology

NEW DISCOVERIES & INVENTIONS

PACKAGING

Water Vapor Permeability of Wrapping Materials

DETERMINING the rate at which water vapor permeates paper and other sheet materials which may be used for wrapping foods is a matter of great importance to the manufacturer as well as to the marketer. The apparatus for this purpose has been subject to extensive cooperative investigation by a number of scientists representing Technical Association of Paper and Pulp Industries (TAPPI). That committee has reported in the form of a preliminary recommendation which is being circulated for trial and use among the producers and users of these wrapping materials. The method as now recommended stretches a sample of the material to be tested over a wide shallow dish exposing at least 30 square centimeters to transfusion by water vapor. A strong desiccant is placed inside so as to maintain the atmosphere under the test specimen thoroughly dry. The rate at which water vapor passes into the dish through the paper is measured by the increase in weight. When a constant rate of moisture gain is observed, that is noted as the water-vapor permeability of the specimen. The results, of course, depend on maintenance of constant temperature and humidity in the space around the apparatus. An alternative procedure measures the rate of evaporation of moisture outward from a dish containing water under the specimen.

Details of the test method are obtainable in a mimeographed report entitled, "Proposed TAPPI Method for Determining the Water Vapor Permeability of Paper and Other Sheet Materials," available on request from the Paper Section, National Bureau of Standards, Washington, D. C.

Wrapping Papers For Frozen Foods

SUITABLE PAPERS or other wrapping materials will protect frozen foods from drying out and from contamination while in storage. Storage temperatures have a decided effect on the length of time meat can be kept without becoming rancid, as well as on the rate of moisture loss. Other conditions being equal, lower temperatures decrease the rate of evaporation and prolong the keeping quality of the fat. Wrapping materials with low moisture transmission also prolong the period before the fat becomes rancid, probably because a moisture film forms on the meat surface and protects the fat from oxidation by air. Frozen meats wrapped in papers that permit the diffusion of moisture tend to dry out and absorb "storage" odors if stored at about 10 deg. F.

The protective value of wrapping materials submitted by manufacturers to the New York State Agricultural Experiment Station was evaluated in respect to: (1) moisture vapor transmission at 5 deg. F. and 50 per cent relative humidity; (2) resistance to blood stains, grease and oils; (3) water absorption; (4) brittleness and cracking at low temperatures; and (5) importing of flavor.

The moisture vapor transmission through various papers is listed below:

Paper	Type	Average loss in grams per sq. meter per day
1	Paper waxed two sides	24.2
2	Paper waxed one side	21.7
3	Paper waxed one side	33.7
4	Paper waxed one side	26.4
5	Parchment, no coating	115.9
6	Parchment waxed one side	18.0
7	Parchment waxed two sides	28.0
8	Parchment with special coating	1.4
9	Semitransparent paper	2.0
10	Laminated semitransparent paper	0.5
11	Special coated vegetable parchment	1.3
12	Special coated vegetable parchment	2.2
13	Special coated sulphite paper	2.3
14	Waxed paper two sides	26.0
15	Transparent viscose sheet (moistureproof)	0.8
16	Transparent viscose sheet (moistureproof)	1.0
17	Transparent viscose sheet (moistureproof)	0.5
18	Transparent viscose sheet (moistureproof)	0.9
19	Transparent viscose sheet (moistureproof)	0.6
20	Transparent viscose sheet (moistureproof)	1.3
21	Transparent viscose sheet (moistureproof)	0.6
22	Transparent viscose sheet (moistureproof)	0.6
23	Waterproofed heat sealing transparent paper	5.8
24	Special wax coated parchment	0.9

Protection of meat and other foods from desiccation is considered adequate if, at 5 deg. F., the paper transmits not more than 3 grams of moisture per square meter per 24 hours.

Waterproofness is not to be confused with moisture-vapor proofness. Parchment papers are usually waterproof but not vaporproof, while waxed papers frequently absorb water and tear easily when wet.

The following materials are considered satisfactory for use in packaging foods for storage in lockers:

E. I. Du Pont de Nemours & Co., Inc.
No. 300 MAT Cellophane
No. 300 Sp. MST Cellophane
No. 450 Sp. MST Cellophane

Sylvania Industrial Corp.
No. 300 STD. Sylphrap
No. 300 BU Sylphrap
No. 300 WP Sylphrap

Riegel Paper Corp.
40 lb. Heat sealing vegetable parchment
35 lb. Heat sealing Ivory Durapak
Diafane
Laminated Diafane

Paterson Parchment Paper Co.
Special coated parchment

The Menasha Products Co.
Paraweld parchment

Dewey & Almy Chemical Co.
Cryo-Vac latex

Digest from "Moisture Vapor Proofness of Wrapping Materials Used on Frozen Foods," by C. W. Du Bois and D. K. Tressler, *Paper Trade Journal* **109**, 15, 1939.

BEVERAGES

New Light on Acid Decomposition in Wine

ACID DECOMPOSITION in wines is being controlled by temperature regulation and date of racking. The death points for most microbes that destroy acids lies between 22 and 26 deg. C. and for *M. malolacticus* Seifert between 25 and 34 deg. C. Temperatures near the thermal death point promote optimum decomposition of the acids. Wines deficient in acids can be guarded against an undesirable decomposition of acids by early racking.

Recent findings suggest that the disassimilation of acids by microbes should be studied from two angles:

1. It is highly probable that some kind of symbiosis exists between the yeasts and the acid destroying bacteria which have lost their ability to synthesize amino acids and other organic nitrogen compounds from inorganic nitrogen. Knowing which type of albuminous substances will separate the bacteria from the yeast may lead to new methods of control. It is also possible these bacteria extract hor-

mones or vitamins from the yeast.

2. Contrary to the general belief that all microorganisms are introduced into the must as dirt on the fruit or berry juices from the outside, it has been found almost simultaneously by different investigators that yeasts as well as bacteria *exist within the cells of plants!* Similar in appearance to those adhering to the outside, these bacteria have lost their faculty of converting inorganic nitrogen in their permanent symbiosis with higher plants. This symbiotic relation continues in the wine.

Digest from "Control of the So-called Biological Decomposition of Acids in Wine," by Prof. Dr. Schanderl. From a paper presented at the International Congress for Viticulture in Kreuznach, Germany, August 21-30, 1939.

CANNING & PRESERVING

High Conversion Corn Sirup In Jellies, Jams, Fruit Butters

The texture or spreading quality and gloss of jellies made with high conversion corn sirup is remarkable. No crystallization of sugar occurs even when jellies are kept at 32 deg. F. for long periods of time. The flavor of jellies is very good, with a sweetness about three-fourths that of sucrose jellies.

Jellies studied included strawberry, red raspberry, black raspberry, blackberry, currant, cherry, crab apple, apple, grape, maple and synthetic. They consisted either of 45 parts of fruit juice to 55 parts of the sirup on a dry basis, or of 50 parts juice and 50 parts sweetening. In making, the jelly should be evaporated to a 67.70 per cent total solids content, determined by refractometer. At that concentration the boiling point will be 220 to 221 deg. F., depending upon the barometric pressure.

Blends of sucrose and the sirup may be used. In general, a high percentage of sucrose gives increased sweetness; a high percentage of the sirup gives improved texture.

The composition and properties of the high conversion corn sirup used are compared with those of ordinary corn sirup in the accompanying table.

	High conversion sirup	Ordinary corn sirup
Moisture	18.50 per cent	19.70 per cent
Sugars	55.73 per cent	27.70 per cent
Dextrines	25.94 per cent	52.35 per cent
Ash	0.28 per cent	0.25 per cent
Total solids	81.95 per cent	80.30 per cent
Specific gravity at 100 deg. F	43 deg. Bé.	43 deg. Bé.
Viscosity at 100 deg. F	58 poises	150 poises
pH	4.8–5.0	4.8–5.0
Dextrose equivalent	65	42
Fermentable extract	68 per cent	34.5 per cent
Sweetness	¾ that of sucrose	⅜ that of sucrose

Jams and preserves were made in the same way as were the jellies, ex-

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COFFEE
Royal Flav-o-tainer, the airtight Pliofilm lined coffee bag has been recently developed especially to give lasting freshness and protection to the delicate flavors of coffee. It has already won wide acclaim among packers, dealers and consumers in the many territories where it has been introduced.
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March 26-29
BOOTH 506

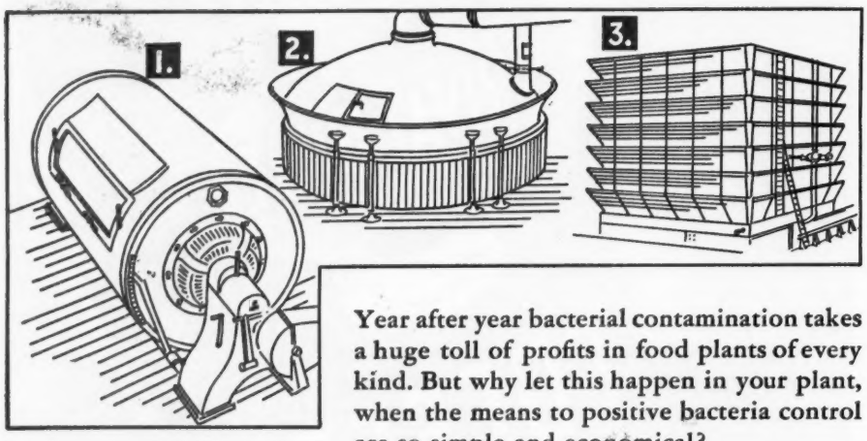
cept that crushed or whole fruit was used instead of fruit juice. A product of superior appearance is produced by cooking the fruit in a vacuum pan. Total solids content should be about 68 per cent, as determined by refractometer. Preserves made with the high conversion sirup have especially good texture and gloss. Neither the jams nor the preserves made with the sirup crystallize upon standing, even at low temperatures.

Here, too, blends of sucrose and the sirup may be used. For an especially sweet product, a high percentage of sucrose is used; for a product with improved texture and appearance, a low proportion of sucrose and a high proportion of the sirup ought to be employed.

To obtain fruit butters with increased fruit flavor and less sweetness than when sucrose is used, two parts of fruit to one part of the sirup is probably the best ratio to have of fruit to sweetening. As a rule, the finished product should have 50 per cent total solids, as determined by the refractometer. The fruit butters studied were peach, plum, pear and apple.

Prevent Spoilage, Protect Quality

WITH HTH PRODUCTS



1. To prevent off-flavors and lowered quality in butter, it is essential to keep churns free from bacterial contamination. In addition to the regular thorough rinsing and cleansing, they should be treated before each use with a 200 p.p.m. solution made from HTH Products.

2. In breweries, HTH Products protect product quality by dependable sterilization of all utensils, pipe lines, filtermass, fermenters, bottles and bottle-fillers, etc.

3. Algae in condenser water causes slime in cooling towers, cuts down the efficiency of the refrigerating system. Ice plants use HTH Products to kill algae in cooling water, also to insure pure water for making ice.

Year after year bacterial contamination takes a huge toll of profits in food plants of every kind. But why let this happen in your plant, when the means to positive bacteria control are so simple and economical?

HTH Products*are chlorine sterilizers in convenient powder form, always full-strength and dependable in action. Added to water, they quickly make fast-killing hypochlorite solutions of the desired strengths for flushing, wiping or spraying all surfaces with which food products come in contact. And being in concentrated form, HTH Products are so economical to use that their positive germ-killing action can be applied throughout the entire plant.

Let HTH Products go to work in your plant now—help you prevent spoilage losses and protect the quality of your finished products. Send for literature and full information.

HTH PRODUCTS

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*HTH PRODUCTS: HTH, HTH-15 and Lo-Box . . . DRY ICE . . . LIQUID CARBON DIOXIDE . . . AMMONIA, ANHYDROUS and AQUA . . . CAUSTIC SODA . . . SODA ASH . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . PH-PLUS FUSED ALKALI . . . GYPSUM PRODUCTS

Abstract of paper read before the National Preservers Association meeting in Chicago, January 22, 1940, by D. K. Tressler, New York State Agricultural Experiment Station, Geneva.

DAIRY PRODUCTS

Time Control in High Temperature Pasteurizers

TIME CONTROL in short time, high temperature pasteurizers by the following procedure has certain advantages over the usual dye method. Instead of adding dye to the pasteurizing water at the entrance of the holding chamber and then measuring the time elapsing before the color appears on the outlet end, a saturated sodium chloride solution is injected by one operator into the water stream entering the holding chamber.

A pair of electrodes, connected to a circuit joining dry cells and a microammeter, are installed at each end of the holding chamber. In passing, the salt solution causes sharp deflections of the ammeters which is timed with a stop watch by a second operator.

The inlet ammeter registers 25 milliampere divisions, subdivided into milliamperes, whereas the outlet instrument records 5 milliampere divisions, subdivided into 0.1 milliamperes.

Digest from "A Method for Checking the Holding Time in Short Time High Temperature Pasteurizers," by D. M. Roger, *Journal of Milk Technology* **2**, 191, 1939.

Causes of Cheesy Butter

BUTTER in trade distribution channels all too often develops a cheesy flavor which may vary from Swiss-like through Cheddar to full Limburger. Apparently this is due to various microorganisms attacking the milk proteins present. The defect is much more apt to develop in print butter than in tub. The usual source of the trouble is the water supply, which may be satisfactory from a public health standpoint, yet lead to cheesy flavors when used in washing butter. Some printing machines have a reworking action on the butter, and this redistributes the contaminating water through the mass, and cheesy flavors follow.

The remedy is to chlorinate *all* the water supply. It may be necessary to use up to 35 or 40 parts per million of chlorine, or else to let the water stand some time in a tank with lower chlorine concentrations. Such high concentrations are naturally corrosive to metal equipment. In one case, with an alkaline water, by adding dilute acid the pH was brought down from 7.8 to 6.8, and chlorine was then effective at 15 parts per million where 40 was needed before.

Changing the acidity of the cream,

increasing the salt up to 4 per cent, or holding the butter at 45 deg. F. did not prevent cheesiness. Waters can be tested for suitability by inoculating sterile skim milk or cream, or by using them to wash butter granules. These are then incubated at 70 deg. F. and tasted every 48 hours.

Another defect, a strong metallic flavor, was traced to the steam used in pasteurizing by direct injection. The boiler water was being improperly treated and the resulting priming and foaming caused iron and manganese compounds to be carried over with the steam. Proper feed water treatment and an adequate steam separator in the line cured the trouble.

Digest from "Trouble Shooting for Flavor Defects," an address by V. L. Turgasen, American Butter Institute, Dec. 5-6, 1939.

FLOUR MILLING

Air Conditioning of Flour Mills Economic not Technical Problem In Damp Climates

ALTHOUGH MILLING OPERATIONS are decidedly influenced by climatic conditions, the advantages attainable by air conditioning must be sufficiently high to cover cost of installation and maintenance of the equipment to make it profitable. In a Dutch mill (seaside, damp climate) the avoidable yield-losses amounted to 0.1 to 0.25 per cent in flour production during a two-year period, the saving of which would not cover air-conditioning operating costs. Main advantages of temperature and humidity control in a mill are (1) increased yields through a cleaner separation of hull and endosperm, as well as reduced milling losses, and (2) greater uniformity of plant operation, less interruptions due to clogging up, and reduced power requirements.

Air temperature is the principal factor influencing milling performance. Equilibrium between the moisture content of the grain and the humidity of the air is reached quicker, the higher the temperature of the mill products. Milling of the grain becomes more difficult in this state of equilibrium as the temperatures of the air and mill products rises. Therefore, the milling system must be cooled during hot weather in some way to prevent high losses in yield. At low temperatures, a higher percentage of humidity in the air is less harmful and causes no loss in yield. For this reason milling losses in warm weather cannot be reduced by increasing the humidity.

Digest from "About the Influence of Humidity and Temperature of the Air on Wheat Millings," by E. Standt, presented at Sixth International Congress of Technology and Chemistry of Agricultural Industries, Budapest, 1939. [Proceedings: Vol. I, p. 421]

MEAT & POULTRY

How to Preserve Bloom in Frozen Poultry

SUCCESSFUL frozen storage practice includes preservation of the fresh appearance, i.e. "bloom", as well as preventing spoilage. Bloom, generally assessed subjectively from the color and opacity of the superficial cell layers, suffers a differential loss during frozen storage depending upon the initial overall quality and color of the birds. White, "milkfed" grades retain bloom much better than yellow or dark colored "selected" grades.

Although during freezing the opacity increases somewhat with the rate of evaporation, the loss of bloom during storage is practically proportional to the extent of evaporation. Because excessive but uniform evaporation from the entire surface is the cause of bloom destruction, high humidities at low temperatures tend to preserve this property. At higher storage temperatures (–13.4 deg. C. = 7.5 deg. F.) loss of bloom and freezer burns

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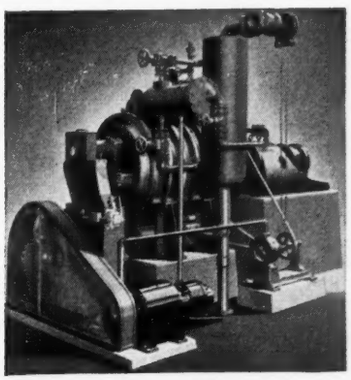

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LACTIC ACID
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BETTER FLAVOR
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● Improvement of flavor and proper adjustment of pH tends to develop a better product and a safer one as bacterial loss is minimized. That's why more and more food and beverage manufacturers have been using Du Pont Edible Lactic Acid.

Whether it's adding brine to olives or tartness to mayonnaise the qualities of Edible Lactic Acid are being recognized by the food chemist.

A trial will convince you as it has many others.

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are more severe than at lower temperatures (–22 deg. C = –7.5 deg. F.) probably due to different rates of evaporation. Relative humidities of 98–100 per cent at –13.5 deg. C. preserve the bloom for over one year, whereas it is destroyed completely at 85 per cent relative humidity. Sealed water resistant liners, such as wax paper, prolong the storage period at –13.5 deg. C. to 50 weeks and more, whereas unsealed packaged birds deteriorate after 20–30 weeks.

Digest from "Frozen Storage of Poultry, Part II. Bloom," by W. H. Cook, *Food Research* 4, 419, 1939.

Factors Affecting Drip in Defrosted Beef

THE RATE of freezing is not as important a factor in the control of drip at the time of defrosting in frozen beef as has been assumed, if the volume of the meat is large in comparison with the area of cut surface of muscle tissue. If, however, the ratio of beef volume to cut surface is small, increased freezing rates reduce the amount of drip materially.

Small steaks, rapidly frozen, retain the fluid longer when defrosted since intrafiber freezing occurs at low freezing temperatures. Slow freezing at higher temperatures leads to extrafiber freezing, subsequently releasing the meat juice more readily as drip on defrosting.

Other factors being equal, freezing temperatures change the structure of the frozen muscle tissue differently (illustrated) whereas the histological appearance of frozen muscle tissue is quite similar to unfrozen tissue.

With each drop of 20 deg. C. in freezing temperatures, the color of frozen beef changes in definite gradation from dark to light.

Digest from "Freezing Temperature as Related to Drip of Frozen-Defrosted Beef" by J. M. Eamsbottom and C. H. Koonz, *Food Research* 4, 425, 1939.

MISCELLANEOUS

Vitamin B_1 in American Staple Foods

PROMINENCE of cereal products and sugar in the American diet raises the question of how adequate is the natu ral-occurring vitamin B_1 intake for general public welfare.

The normal daily requirement appears to be a minimum of 10 international units of vitamin B_1 (1/300 mg. of pure thiamin) per 100 food calories for adults and of 2 to 2½ or more times that for pre-school children.

With one-fourth or more of the total calories in the daily diet coming from cereal products and about another 17 per cent coming from the sugar consumed the indications are that the intake of vitamin B_1 is seriously inadequate. Refined sugar is regarded as completely lacking in vitamin B_1 and white flour (the most widely used cereal product) is credited with retaining only about 1/11 of the vitamin B_1 content (0.15 international unit per gram) of the wheat from which it is made.

Although emphasis has been placed on protective foods by students of nutrition, the milk, green vegetables, and fruits so identified do not rate high in vitamin B_1 content. An alternative means of meeting the deficiency in vitamin B_1 content is to add it to the dietary staples rather than have it prescribed by the physician as a diet corrective pharmaceutical.

In as much as cereals, particularly wheat flour, play such an important part in the American dietary, recommendation is made that wheat flour products may be the carriers for the added vitamin B_1. Also that it be added in sufficient quantity to give a safety factor of about 3 times the minimum requirement for adults and thereby assure the minimum requirement for pre-school children.

This method of correcting what appears to be a vitamin B_1 deficiency in American dietary staples has been made possible through comparatively recent isolation and synthesis of vitamin B_1 (thiamin) on a commercial basis.

Digest from "The Need for the Addition of Vitamin B_1 to Staple American Foods", by George R. Cowgill. Journal of the American Medical Association 113, 24, 2146, 2151, 1939.

OILS & FATS

For Better Cottonseed Oil

TO OBTAIN the best quality cottonseed oil, cotton should be picked as soon as it opens, the seed cotton dried and ginned, and the cottonseed dried, all within a period of possibly fifteen days after maturation of the bolls. This treatment will effect an initial dehydration of the plant juices in the seed that is necessary to insure that the enzymes remain dormant. According to this theory, proposed last year G. S. Meloy of the Bureau of Agricultural Economics, the seed dries out when the bolls burst open in a normal season, but in a wet season the seed cannot dry out. Thus, if atmospheric humidity prevents dehydration of the plant juices in the seed, enzymic activity continues. Unfortunately, the enzymes apparently reach a peak of oil formation and then reverse themselves, destroying the oil and protein and

forming free fatty acid. "Field damaged" seed is produced under such conditions, and until dehydration does occur, the acidity continues to rise.

Digest from "The Role of the Enzyme in the Relative Value of Cottonseed," by G. S. Meloy, Senior Marketing Specialist, Bureau of Agricultural Economics. An unnumbered mimeographed document issued by the Department of Agriculture.

PICKLING

Gas Production In Cucumber Pickles

DURING active fermentation the carbon dioxide content of the gas evolved in the brine pickle fermentation varied from less than 50 per cent to above 99 per cent, depending largely upon the salt concentration. Gas production in brines of 40 and 60 deg. saturation was higher than in brines of 20, 30 and 80 deg. concentration.

Gases of similar composition were produced in the brine as well as in the cucumbers. In addition to carbon dioxide, oxygen, hydrogen and probably nitrogen were formed in this fermentation. The amounts of oxygen produced were exceedingly small (0.2–0.3 per cent), coming largely from small bubbles within the cucumbers. Larger amounts of oxygen indicated that something was wrong; they also served as a check for the introduction of air.

Whereas in all 60 deg. brines hydrogen was produced in appreciable quantities, this gas was either absent of was present only in smaller amounts in brines of lower concentrations. In 60 deg. brines the hydrogen content ranged around 40 per cent during the early part of active fermentation, and decreased from the 21st day on.

Inasmuch as "bloaters" (hollow cucumbers inside of which gas accumulates) were found in fermentations with, as well as without, hydrogen production, hydrogen formation within the cucumbers cannot be considered the sole cause for bloaters. Gases formed in the interior of bloaters had approximately the same composition as gases from the tops of the vats.

Among the fermentation organisms, acid formers outnumbered by far the peptonizers of the soil group and the yeasts present. These predominant organisms, however, were not responsible for the hydrogen production. The causative agent, present in small numbers, was isolated and is now being studied for identification.

This work was done under Southern conditions. Changes in outside influences or processing methods may affect the gas production.

Digest from "Gaseous Products of Cucumber Pickle Fermentations," by M. K. Veldhuis and J. L. Etchells, *Food Research* 4, 621, 1939.

MOBILIFT FOR ORGANIZED EFFICIENCY

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MIGHTY MIDGET MOBILIFT
TRADE MARK REG. U.S PAT OFF.

Once upon a time there was a canner who operated on a very "narrow margin." After he had installed all the latest processing machinery he was still perplexed over his inability to make adequate profits. One day, he heard how MOBILIFTS could speed up handling operations and cut costs in two. Now the wise canner has MOBILIFTS carrying, lifting and piling his pack and making him more money than ever before.

MOBILIFTS cost less than 25c an hour to operate. Designed with special forks for cannery use, priced a little over $1000 at factory. Light in weight (approx. 2600 lbs.) Carry up to a ton and can lift to 14-foot ceiling. Write for special cannery bulletin.

MOBILIFT

MFG. BY VAUGHAN MOTOR CO., 831 S. E. MAIN ST., PORTLAND, ORE.

Formulas for Foods

Correction

RE FORMULA NO. 36

In FOOD INDUSTRIES, January, 1940, page 94, Formula No. 36 was entitled "Marshmallow Fluff." Since that time we find that the name Marshmallow Fluff is the registered trade name of a product manufactured by Durkee-Mower, Inc., Lynn, Mass., for the past 25 years. The product discussed under Formula No. 36 should have been called "Marshmallow Cream."

FORMULA NO. 55

Prepared Waffle Flour

Flour (general purpose type)	**100 lb.**
Soda (sodium bicarbonate)	**1½ lb.**
Mono-calcium phosphate	**1 lb. 3 oz.**
Sodium acid pyrophosphate	**1 lb. 2 oz.**
Flour salt	**2 lb.**
Powdered whole egg	**3 lb.**
Sugar	**12½ lb.**
Shortening (plastic)	**20 lb.**
Dry milk solids	**12½ lb. or more**

Mix flour and soda 2 or 3 minutes before adding remainder of dry ingredients. Continue mixing to make total time of 20 minutes.

Add shortening. If horizontal ribbon type mixer is used, continue mixing for 45 minutes. If trowel type is used, continue mixing for 8 to 12 minutes, depending upon consistency of shortening and mixing room temperature. If horizontal ribbon type mixer is strung with cutting wires as sometimes used for pie crust mixes, continue mixing for 25 to 30 minutes.

Do not continue mixing beyond the period necessary to get uniform, homogeneous distribution of shortening.

Formula from Dry Milk Institute

FORMULA NO. 56

Smoked Chum Salmon Hors d'Oeuvres

Use large fish, weighing more than 10 lb. Split and remove backbone, trim off fins, but leave nape bone attached. Remove ribs. Wash the sides. Chill in 25 to 40 deg. Sal. brine containing enough crushed ice to keep it at 32 to 35 deg. F.

Leave in brine for 30 minutes to draw out blood and "case-harden" the fish. Then remove and drain. Next place in pickle (formula below) containing nitrite to retain red color.

For 50 lb. of salmon:

Brine (60 deg. Sal.)	**4 gal.**
Brown sugar	**4 lb.**
Mixed pickling spice	**¼ lb.**
Sodium nitrite	**⅕ oz.**

Place spices in cloth bag; boil four successive times, in one quart of fresh water each time. This spice extract totals 1 gal. Add to it 3 gal. of water in which the sugar and nitrite have been dissolved. Add salt (NaCl) to bring the 4 gal. mixture up to 60 deg. Sal. Cool.

Pickle the sides in this liquid for 4 to 5 days. Keep brine to 60 deg. Sal. by adding more salt as fresh sides are added to the pickle. Do not permit the fish sides to stick together. After 4 days, remove and drain for 1 hour after a superficial rinse with fresh water.

Place sides on galvanized wire trays and cold-smoke at 72 to 75 deg. F.

This product is semiperishable but will keep for a considerable time at 28 to 32 deg. F. It is mild and tender instead of salty and dry. When sliced, it may be eaten in sandwiches or used in salads.

Formula from Pacific Fisheries Experimental Station, Progress Report No. 42, Naniamo, B. C.

FORMULA NO. 57

Hot Cocoa Powder

Skim milk powder	**23 lb.**
Cocoa (Dutch type)	**30 lb.**
Powdered sugar (sucrose)	**50 lb.**
Vanilla sugar	**1½ oz.**
Salt	**10 oz.**

The skim milk powder should be of good quality to eliminate the chance of a rancid taste developing in a short time. The cocoa powder should be strong, usually Dutch type. The vanilla sugar is a common commodity from flavor houses.

The ingredients are mixed together and if possible put through a pulverizer.

One ounce in five ounces of boiling water makes a cup of hot cocoa, which may be improved with a little whipped cream.

Formula from David Algie

FORMULA NO. 58

Vanilla Extract

Vanilla beans	**10 lb.**
Pure alcohol	**5 gal.**
Water	**5 gal.**

Working Directions

The quality of the extract depends upon the quality of the vanilla beans and a careful selection from those available should be made. The beans should first be chopped fine and then soaked over night in the alcohol and water (macerated). The liquid should then be allowed to drip off at the bottom and poured back on to the top until desired color standard is reached. This color is a matter of choice at first and then becomes a standard.

To secure best results and eliminate losses, this procedure is best done in a percolator built for the purpose.

Formula from David Algie

FORMULA NO. 59

Liver and Bacon Sausage

Smoked bacon rinds	**25 lb.**
Bacon ends	**15 lb.**
Hog stomachs	**10 lb.**
Beef tripe	**15 lb.**
Hog livers scalded	**35 lb.**
Dry milk solids	**3½ lb.**
Onions	**4 lb.**
Salt	**2 lb.**
White pepper	**6 oz.**
Marjoram	**1½ oz.**

Cook bacon rinds, bacon ends, hog stomachs and beef tripe until tender.

Place rinds, hog livers, hog stomachs, beef tripe, onions, bacon ends and dry milk in order named in silent cutter. While chopping, add spices. Chop fine. Put in meat truck and add 20 to 25 lb. of meat broth. Mix well.

Stuff in hog bungs. Cook 30 to 45 minutes, depending on size of casing. Chill in cold water. When chilled hang up to dry.

Formula from Dry Milk Institute

(Turn to page 104)

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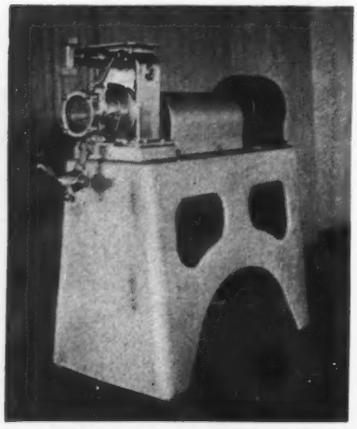

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FORMULA NO. 60

Frankfurts No. 3

Veal trimmings	**75 lb.**
Regular pork trimmings	**25 lb.**
Dry milk solids	**3½ lb.**
White pepper	**6 oz.**
Ground anise	**1 oz.**
Ground caraway seed	**1 oz.**
Ground mustard	**3 oz.**
Salt	**3 lb.**
Quick cure. (See Formula No. 23)	**1 qt.**

See also General Directions (Formula No. *22*).

Formula from Dry Milk Institute

FORMULA NO. 61

Preserving Citron*

The citron, picked green after it has attained its full growth, is perforated over the entire surface at points about an inch apart and cut in halves. The small amount of pulp and seeds is allowed to remain, as it is more easily removed after the brining process. The halves are placed in wooden vats or crocks and covered with a 3.5 per cent salt solution, the citron being held under the solution by suitable covers and weights. Depending upon the temperature of the room, more or less fermentation will take place, as is shown by the bubbling of carbon dioxide gas in the salt solution. (In one case where the room temperature varied from 50 deg. to 88 deg. F., the temperature of the brine varied from 54 deg. to 74 deg. F., and fermentation was nearly over in seventeen days. The top of the brine contained a heavy scum with a typical vinegar or acetic acid odor, but no mold was present. The solution was quite cloudy, and the peels were translucent from the outside to a point about half way to the pulp.) After about fifteen days, the brine is replaced with fresh brine, and generally very little more fermentation occurs, although the citron will become translucent throughout in a few days. If now, after the peel is translucent, 0.17 per cent potassium metabisulphite is added, and the salt increased to 12 per cent, the peel can be kept in the brine solution for several months without molding, the length of time in this case also depending on the temperature. The 0.17 per cent potassium metabisulphite will produce in the salt solution 0.10 per cent sulphur dioxide, which acts as a satisfactory preservative to prevent mold and does not affect the green color.

The brining process gives the peel a firmness and translucent appearance that remains after the preserving or the siruping process has been completed.

After removing the pulp from the peels, the peels are boiled gently for 30 minutes in fresh water, followed by another boiling for 20 minutes, or until a needle will easily penetrate them.

Two different types of sirup can be used to preserve or candy the peel. One contains only cane or beet sugar, but enough citric acid is always present to invert part of the sugar during the processing so that the sugar will not crystallize in the peel when stored. Citric acid in the amount of 0.05 per cent is added to the sirup at the beginning, and twice during the processing 0.02 per cent more is added. The other type of sirup is made up so that it contains either 40 per cent glucose or corn sugar, or one of the commercial invert sugars. The remaining 60 per cent consists of cane or beet sugar. Peel made with either type of sirup is of the highest grade, retaining the desired green color and translucent, firm appearance.

The siruping process is carried out as follows: Heat a 20 deg. Brix (20 per cent) solution of either type of sirup to boiling. Add the half peels and set aside over night. Remove the citron from the sirup and add enough sugar to raise the Brix to 30 deg. Heat to boiling, add the citron, and set aside for two days. Continue this process of raising the Brix or percentage by 10, setting aside for one day longer each time, until 60 deg. Brix is reached. Then next time raise the Brix to 75 deg., but allow the peel to remain in the sirup while heating to the boiling point. Set aside for one day longer than at 60 deg. Then heat to boiling, remove the peel from the sirup, and quickly dip it twice into hot water. This removes the excess sirup. Place in front of a fan for about 12 hours, or until the citron is comparatively dry.

Candied Citron Pieces

A rather delightful confection can be made by slicing the brined peel, boiling twice in water until tender and then candying. The slices should be about ⅛ in. thick, and the candying can be hastened by raising the Brix 20 deg. each time instead of 10 deg. Half-inch cubes or dices can also be produced in a similar manner. The final product is dipped quickly into hot water and dried with a fan. The pieces or slices may also be rolled in powdered sugar if it is desired to make an especially dry and sugary confection.

* *Formula by H. D. Poore, Laboratory of Fruit and Vegetable Chemistry, Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Los Angeles, Calif.*

Books

Water, Sewage Technology

MICHOBIOLOGY OF WATER AND SEWAGE. By P. L. Gainey. Published by Burgess Publishing Co., 426 South Sixth St., Minneapolis, Minn., 1939. 283 pages, multigraphed; 9x10¾ in.; paper, spiral binding. Price, $3.

This work was prepared to acquaint the reader with the fundamental principles of microbiology as they affect engineering problems encountered in connection with water supplies and sewerage. So it deals with two of the important problems of the food technologist and plant superintendent. And the book is not written in highly technical language, making it doubly practical. Laboratory exercises are included to give the student an opportunity to put theory to practice.

Help on Your Income Tax

YOUR INCOME TAX. By J. K. Lasser. Published by Simon and Schuster, 386 Fourth Ave., New York, N. Y., 1940. 128 pages; 8½x11 in.; paper. Price, $1.

There are two ways to keep your income tax down—by making every deduction to which you are entitled and by preparing the return quickly and correctly to avoid penalties and interest charges. This book was written to enable you to do those things.

Written in the language of the layman, equipped with examples of how to figure the tax and the deductions and provided with an index that quickly selects the answer to a particular problem, the book is a practical one. It covers both individual and corporation income taxes, and includes income tax changes made in 1939.

How To Use Food Brokers

MARKETING THROUGH FOOD BROKERS. By A. Urban Shirk. Published by McGraw-Hill Book Co., Inc., 330 W. 42d St., New York, N. Y., 1939. 302 pages; 6¾x9¼ in.; cloth. Price, $3.50.

Top executives and sales managers in the food manufacturing business ought to avail themselves of the facts contained in this book, if they have not already learned them through experience. The broker is an important factor in food distribution, especially for the smaller companies which cannot finance the fixed charges of a salaried sales force. There are hundreds of these brokers functioning as sales agents for processors in the principal marketing centers of the country, taking commission as their pay.

The various chapters in this book tell what the broker is, how he operates, where he is located, what he charges, how to select brokers and allocate their territory and in general how to use them to best advantage. There are some case histories, such as that of the sales manager who used brokers to step up the sales volume of a canned meat from zero in 1932 to well over $700,000 in 1938.

Facts about Country Hams

QUALITIES OF HAMS AND RAPIDITY OF AGING AS AFFECTED BY CURING AND AGING CONDITIONS AND PROCESSES. By W. E. Hunt, W. C. Supplee, Devoe Meade and B. E. Carmichael. Published by The University of Maryland Agricul-

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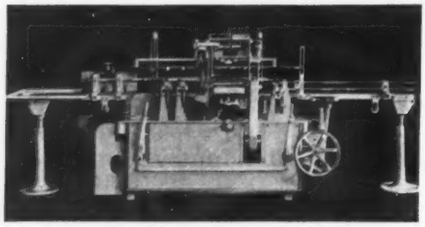

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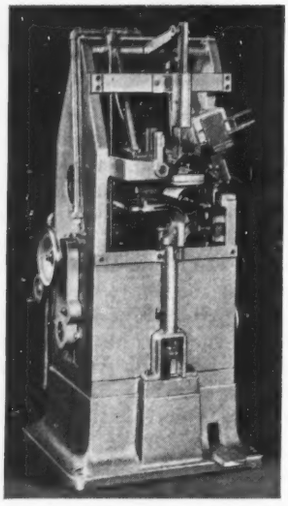

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tural Experiment Station, College Park, Md., 1939. Bulletin No. 428. 84 pages; 6 x 9 in.; paper.

In this bulletin are reported the results of nine years of research on the methods of making country cured hams. The studies cover chemical composition, mechanical separation, bacterial flora, shrinkage losses and palatability of hams aged for varying periods of time under normal temperature conditions. Attempts to speed aging were made, but the proteolytic enzymes injected gave an objectionable odor and flavor in most cases.

Guide to Facts about Foods

GASTRONOMIC BIBLIOGRAPHY. By Katherine Golden Bitting. Published by A. W. Bitting, 1030 Green St., San Francisco, Calif., 1939. 718 pages; 7½ x 10 in.; cloth. Price, $8.

Here is a tool of practical value to the research and promotion departments of food companies. And it, of course, has much to offer gourmets, dietitians and those with an interest in the origin and development of the foods eaten by the world.

A byproduct of food research extending over a period of nearly 50 years, the bibliography lists 5,000 titles. These titles date from 1484 and are in Greek, Latin, Italian, Spanish, French, German, Dutch, Swedish, English and other languages. It is a compilation the like of which would take years research and thousands of miles of travel about the world.

By using this bibliography as a guide to source material, food research workers can equip themselves with new ideas for foods—new formulas. And advertising men can capture some of the romance of food, some of the history and some of the artistic appreciation of attractive dishes with which to point their copy to an interested public.

Manual on Locker Operation

REFRIGERATED LOCKER STORAGE. By P. B. Redeker. Published by Business News Publishing Co., 5220 Cass Ave., Detroit, Mich. 1939. 112 pages; 6 x 8¾ in.; paper. Price, $1.

Practices used by experienced locker plant operators and advocated by frozen food authorities in storing meats and fruits and vegetables are summarized in this manual. The book covers plant design and construction, engineering and equipment, operation and development, merchandising and promotion and the preparation, freezing and handling of fruits and vegetables. There are sixteen engineering and cost tables in the book.

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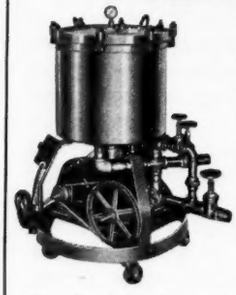

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How Canned Foods Are Used

THE CANNED FOODS COOK BOOK. By Virginia Porter & Esther Latzke. Published by Doubleday, Doran & Co., Inc., 14 West 49th St., New York, N.Y., 1939. 343 pages; 5⅜x8⅜ in.; cloth. Price, $2.49.

Bachelors, working wives and harassed mothers are the people for whom the authors designed this book. The idea is to show them how to turn canned foods into culinary delights, as well as to provide them with a buying guide and tell them how to read and interpret labels. For those in the food industries, it is a collection of recipes for things people like to eat, and contains ideas as to how manufacturers' products are used by the consumer.

Statistics on Sugar

SUPPLEMENT—SUGAR ECONOMICS, STATISTICS AND DOCUMENTS. By Myer Lynsky. Published by United States Cane Sugar Refiners Association, 136 Front St., New York, N. Y., 1939. 120 pages; 6 x 9 in.; paper. Price, $1.

This manual of new facts about the sugar industry brings up to date and expands the statistical and documentary information originally presented in the first edition of Sugar Economics, Statistics and Documents published in 1938. The data cover production, marketing, quotas, prices, incomes, earnings and securities trends. Developments under the Sugar Act of 1937 are indicated by official documents as well as statistical facts.

Patents

Starch and Gluten in Starch Manufacture Separated by Centrifugal Force—Albert Peltzer and Albert Peltzer Jr., Palo Alto, Calif., to Marco Centrifugal Separator Co., Ltd., San Francisco, Calif. No. 2,186,037. Jan. 9, 1940.

Jams, Apple Butter and the Like Given Standard Predetermined Jell Strength by Addition of Pectin Concentrate Made From Peels and Cores of Apples—William A. Rooker, Martinsburg, W. Va. No. 2,186,044. Jan. 9, 1940.

Dextrose-Containing Sugar Products Made From Carbohydrates by Acid Hydrolysis Within Range of pH 2.3 to 3.0 for All High Temperature Operations—Waldemar Kröner and Heinz Kothe, Berlin, Germany. No. 2,186,075. Jan. 9, 1940.

Glutamic Acid Precipitated From Solution by Addition of Ammonium Formate—Géza Braun, to Standard Brands Inc., New York, N. Y. No. 2,186,162. Jan. 9, 1940.

Eggs Candled Mechanically Involving Use of Photo Electric Cells—Raymond R. Haugh, to Kraft Phenix Cheese Corp., Chicago, Ill. No. 2,186,196. Jan. 9, 1940.

Food Materials Dried Into Film Form by Mechanical Units Containing Drying and Cooling Zones, With Intervening Conveyor—William W. Cowgill, Fairfield, Conn., to Sardik Inc., Jersey City, N. J. No. 2,186,282. Jan. 9, 1940.

Potato Chips Fried on Batch Basis in Small Capacity Fryer Equipped With Agitator—Jordan A. Reidenbach, Ashland, Ohio. No. 2,186,345. Jan. 9, 1940.

Freshly Baked Bread Given Surface Sterilization by Passage Through Tunnel Equipped With Sources of Ultra Violet Rays—Charles W. Bart, Savannah, Ga. No. 2,186,401. Jan. 9, 1940.

Citrus Fruit Rinds Subjected to Sulphur Dioxide For Period of Time to Harden Preparatory to Candying—William C. Luban, Tampa, Fla. No. 2,186,549. Jan. 9, 1940.

Fruits Given Protective Coating of Wax Containing N—N' Dichloroazodicarbonamidine—Thomas R. Belzer, Los Angeles, Calif, to Socony-Vacuum Oil Co., Inc., New York, N. Y. No. 2,186,691. Jan. 9, 1940.

Citrus Fruit Rinds, Cellular Tissues, and Seeds Ground Into Fine Paste to Give Uniform Non-Free Flowing Mass, Spread Into Thin Film on Heated Rotating Surface, Evaporated to 10 Per Cent Moisture Without Scorching and Scraped Off Into Thin Flake Form—Glen Overton and Lyle S. Overton, Kalamazoo, Mich., to Glen Overton. No. 2,186,907. Jan. 9, 1940.

Doughs Baked in Pans Stacked Compactly on Top of Each Other But Alternately Arranged to Permit Access of Air to Interior of Pans—John MacManus, to Cushman's Sons, Inc., New York, N. Y. Nos. 2,187,354 and 2,187,355. Jan. 16, 1940.

Yeast Given Retarded Fermentation Action and Prolonged Preservation by Mixing 1,000 Parts of Yeast, Having Water Content of About 70 Per Cent, with 100 to 800 Parts of Sugar as Well as 100 to 800 Parts of Table Salt—Jean Christian Matti, Pully, near Lausanne, Switzerland, to Compagnie Internationale de Procedes de Panification "Itam", Paris, France. No. 2,187,357. Jan. 16, 1940.

Vanillin Made from Lignin-containing Materials—Leo Schulz, to Schimmel & Co. A. G., Miltitz, near Leipzig, Germany. No. 2,187,366. Jan. 16, 1940.

A. M. S. Standards *for* FOODS
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Beginning with the July issue, FOOD INDUSTRIES has been publishing the new Quality Food Standards as promulgated by the U. S. Department of Agriculture. In addition to printing all the rules and specifications, FOOD INDUSTRIES has reproduced the actual colors which are specified by the Department for color grading, which represents an important factor in determining the final grade of the products in question.

To insure accurate reproduction of the colors, specified by the Department of Agriculture from Maerz and Paul's "Dictionary of Color," or the Munsell System, Arthur S. Allen, one of the country's most outstanding colorists has been retained by FOOD INDUSTRIES as Consulting Color Editor. Mr. Allen is supervising the color reproductions in the series of food quality standards which FOOD INDUSTRIES will publish as rapidly as these are issued.

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Citrus Fruit Juices Concentrated by Freezing—Gotthold Harry Meinzer, Glendale, Calif., to California Consumers Corp., Los Angeles, Calif. No. 2,187,572. Jan. 16, 1940.

Vitamin Content of Fish Press-water Recovered through Concentration Following Precipitation of Protein and Clarification by Filtering—Sven H. Lassen, Los Angeles, Calif., to Philip R. Park, Inc., Outer Harbor, San Pedro, Calif. No. 2,188,008. Jan. 23, 1940.

Flavor of Coffee Improved by Exposure of Berries to Ultra-violet Rays—Gwynne Evans, St. Louis, Mo. No. 2,188,179. Jan. 23, 1940.

Cereal Food Formed from a Blended, Partially Expanded Mixture of Farinaceous Material, Wheat Germ and Bran—Clarence E. Felt and Louis J. Huber, Minneapolis, Minn., to General Mills, Inc. No. 2,188,180. Jan. 23, 1940.

Yeast Propagated on a Continuous Basis by Growing in a Nutrient Solution Circulating in an Alternate Ascending and Descending Path in a Compartmented Vat—Heinrich Scholler and Max Seidel, Solin, near Munich, Germany. No. 2,188,192. Jan. 23, 1940.

Fermentable Sugars Made from Cellulose by Treatment with Dilute Acid under Pressure—Heinrich Scholler, Munich, Germany. No. 2,188,193. Jan. 23, 1940.

Honey Biscuits Made To Contain Sirup Having from 30 to 45 Parts of Dextrose Hydrate in Addition to Invert Type Sugars—Theodore John Otterbacher, Zion, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,188,481. Jan. 30, 1940.

Chocolate Coating Made from Chocolate Liquor, Dextrose, Gelatin and Gelatinized Thin Boiling Starch—Collins Veatch, La Grange, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,188,489. Jan. 30, 1940.

Milk Solids Given a Protective Exterior Coat by Exposure to Fresh Current of Heated Air Following Drying in Finely Divided State—Joseph M. Hall, Chicago, Ill. No. 2,188,506. Jan. 30, 1940.

Doughs in Strip Form Twisted by Mechanical Means—Martin E. Fonken, Beloit, Wis., one-half to L. E. Caster, Rockford, Ill. No. 2,188,536. Jan. 30, 1940.

Custards Frozen in a Continuous Manner—Carl Kaltenbach and Ludwig Schmitt, New York, N. Y. No. 2,188,551. Jan. 30, 1940.

Lactose Crystalized out of Heavy Concentrated Solution and Dried by Spreading Over Heated Surface Covered with a Layer of Seed Crystals—Charles O. Lavett, to Buffalo Foundry & Machine Co., Buffalo, N. Y. No. 2,188,907. Feb. 6, 1940.

Proteins Coagulated from Dilute Protein-bearing Liquors by Withdrawing and Heating Portion of Liquor Which upon Return to Main Body of Liquor Keeps It at Temperature above That Necessary to Start Protein Coagulation—Charles O. Lavett, to Buffalo Foundry & Machine Co., Buffalo, N. Y. No. 2,188,908. Feb. 6, 1940.

Chocolate Liquor, Having a Butter Fat Content in Excess of 35 Per Cent, Heated to between 180 and 210 Deg. F. and Emulsified with One-third to Two-thirds of Its Weight of Water to Give a Smooth, Fine Grained, Paste Like Mass—John L. Klewer, Chicago, Ill. No. 2,189,144. Feb. 6, 1940.

Bread Baked in a Traveling Tray Oven with Door at One End and Horizontal Heating Flues Extending Full Length of Chamber below Line of Travel for the Loaded Trays—John V. Cook, Chicago, Ill., to Petersen Oven Co., Chicago, Ill. Nos. 2,189,167 and 2,189,168. Feb. 6, 1940.

Doughnuts Fried in a Deep Fat Cooker Equipped with a Rotatable Screen to Cause Turning of Doughnuts After Immersion—William T. Dusterdick, Denver, Colo. No. 2,189,200. Feb. 6, 1940.

Doughnuts Formed During Discharge of Dough from Unit Fitted with a Discharge Spout at Lower End, a Cutter Mounted at Lower End of Spout and a Reciprocately Acting Plunger—Irvin F. McDonald, Los Angeles, Calif. No. 2,189,217. Feb. 6, 1940.

Egg Albumin Prepared for Drying by Acidifying Whites at a Temperature of About 45 to 50 Deg. F. to Give a pH of Between 4.5 and 5.0 and Filtering in the Presence of a Filter Aid—Verne D. Littlefield, Beverly Hills, Calif., to Armour & Co., Chicago, Ill. No. 2,189,380. Feb. 6, 1940.